CHEMICAL MARKETS

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One Well-learned Lesson

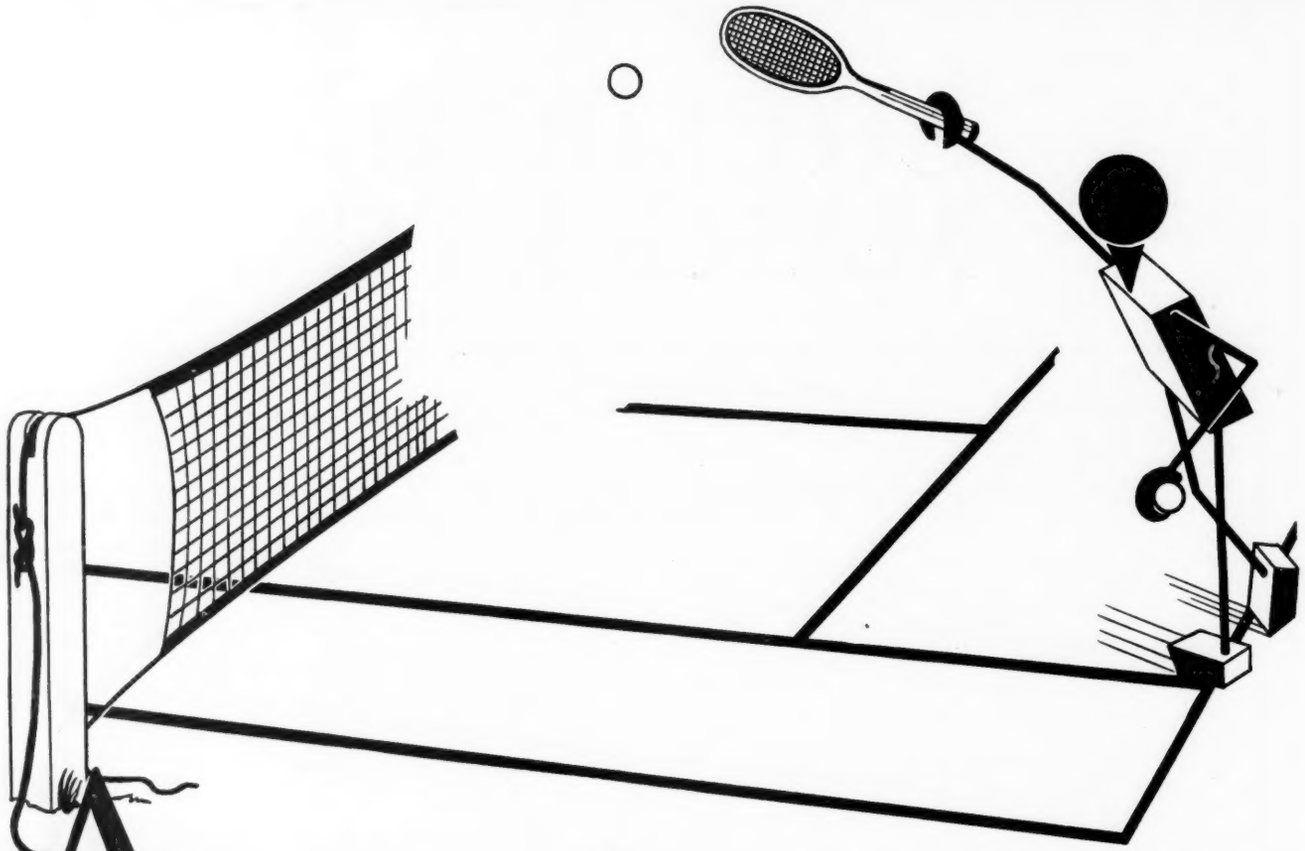
FOR the first time in twenty-four lean and gloomy months those of us whose business deals with basic commodities have been able, during the past three weeks, to read the business news with some degree of satisfaction. After two years of frantic, futile efforts to circumvent the laws of economics it does at last begin to seem probable that statesmen, financiers, and industrialists have at last been convinced that the depression is fundamentally a readjustment to a lower price level with a new resulting balance of supply and demand.

UP TO this point, the heavy burdens of this universal realignment of economic values has been borne chiefly upon our shoulders. With but a few exceptions the price of industrial chemicals, as shown on another page, is below the pre-war quotations of 1914—and the same is true of the metals, the cereals, the fibres, the fuels which with chemicals are the raw materials of our industrial civilization. Against this extremely thorough-going deflation we find that wages, transportation charges, rents, and taxes are still very markedly above the post-war peak of 1920. The general level of all prices—including our own very low quotations and the very high tax rates—stands now, according to the U. S. Bureau of Labor Statistics, at 30.5 per cent below 1920; but still 45.9 per cent above 1914.

IS IT any wonder "the times are out of joint?" Can we be blamed for finding joy in the drastic dose of deflation being swallowed by politicians and bankers and wage earners?

IN THIS number we publish an article by the President of the New York Stock Exchange that deserves wide reading outside of chemical circles. The principles he expounds have been taught our chemical executives by the hard, painstaking teacher Experience. "The butcher, the baker, the candlestick-maker;" the landlord, the banker, the tax collector have been playing hookey from this school too long.

IT IS the economic function of the raw materials to lead in price making. If we bear the brunt of declines: we ride the crest of advances. Our present position is by comparison one of security; but it will not be comfortable until the burden of the decline has been more evenly distributed.



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Another Chemical Solution Speakers and subjects scheduled for the Third International Conference on Bituminous Coal to be held at the Carnegie Institute of Technology during the week of November 16, reveals a growth, both in the time given to problems of a strictly chemical nature, and to the number of chemists and directors of chemical research who will take part in the program.

The coal industry, specially the bituminous division, has been chronically ailing for years. But a few weeks ago the president of the largest single producing company in this country publicly stated that the only solution was the nationalization of our coal reserves. This is, of course, a roundabout way of saying that the Government should close down the high cost mines. In England the same proposal has been made thousands of times. For years the coal industry has maintained that its problem was fundamentally one of more efficiency in mining operations and greater economy in distribution. The chemist has received little encouragement to help in the solution. The practical coal man has considered coal as something to burn. He has difficulty in visualizing a future in which "heat" may become the relatively unimportant "by-product" and a long series of industrial chemicals the major operation.

On complete gasification coal produces carbon monoxide and hydrogen and from these, by direct catalytic synthesis, methyl and other alcohols, esters, and important ketones have been produced. Such processes will surely be refined to the point where they can compete commercially as the by-products of coking now compete in many fields. Such chemical progress indicates that the future prosperity of the coal industry is to be found in the research laboratory rather than in the public ownership of coal lands. It is therefore, an encouraging sign to note the prominence of the chemist and his co-worker, the engineer in the coming Conference. The coal industry needs "chemical analysis" in the broadest meanings of both those words. A whole hearted recognition of this necessity is the first step in the right direction.

Lower Mercury Markets Foreign chemical producers who, in the boom years following recovery from post war depression, found the cartel allotment of markets the most satisfactory method of distribution are now experiencing pronounced difficulties with these controlled arrangements. The failure of the nitrogen producers to renew the nitrogen pact is famous, but one after another similar agreements have been seriously modified or completely abandoned. Citric acid, tartaric acid, bromides, and now mercury have been forced to extremely low price levels despite the supposed stonewall defenses of their respective cartels.

The reduction in the price of mercury at the beginning of July from £21 15s, f. o. b. Spanish or Italian ports, to the recent figure of £16 15s is reflected in a reduction in this country from a high of $103 a flask to $78. Plenty of substantiating proof is available that the Italo-Spanish cartel (Mercurio Europeo) has held prices for a long time at too high levels and that a scaling down was necessary to stimulate buyers into a market from which they had withdrawn as a protest. America continues to be the principal consumer and our purchases abroad are seriously curtailed by sizable domestic production. While the rumors that the Mercurio Europeo was dissolved are undoubtedly untrue, it is quite probable that a decided rift has occurred between the Spanish and Italian producers. In the meantime, the cartel has offered a prize of £5,000 for any discovery which will produce a new use absorbing 5,000 additional flasks by 1935.

Safety First In the year ended June 30, New York State Department of Labor awarded over 36 million dollars in 103,000 cases of accidental injuries occurring in industrial plants. Those who have belittled in any way the importance of safety measures and instruction may find in these startling figures food for sober reflection. On October 12 through 16, the National Safety Council will hold the 20th Annual Safety Congress and Exposition at Chicago. The chemical section will, as usual, play an important part in the sessions. Company executives from office and plant should lend every encouragement to this work by sending representatives to Chicago.

Prominent members of the technical staff of the National Safety Council have been writing a series of articles on various phases of accidents in chemical manufacturing operations for our Plant Management section. The subject is an important one. Viewed either from the monetary or humanitarian viewpoint, safety work pays worthwhile dividends. Intangible savings are the hardest to visualize, but they are, in the case of accident prevention work, real and sufficiently large to warrant

each company sending at least one man to learn what is being accomplished by up-to-the-minute safety devices and practices.

Figures conclusively show the steady improvement that is being brought about by safety instruction in chemical plants. In 1928 the frequency rate stood at 18.87, while in 1930 it dropped to 15.16. Unfortunately the severity rate for the same 106 reporting plants does not show a similar decline. This is but all the more reason why at this Congress former attendance records should be broken.

"To Whom Honor is Due" On September 21 scientists from all over the world gathered in London to commemorate the centenary of Michael Faraday's discovery of electromagnetic induction. First a student of and later successor to Sir Humphrey Davy, Faraday is better known as a physicist than as a chemist, but it is well to remember that in those days specialization had not reached our present degree of refinement. In recent years the close bonds between the two sciences have become strengthened and so it seems now quite prophetic that the genius Faraday made important and far-reaching contributions to both chemistry and physics.

Of late there have been attempts to belittle Faraday's noteworthy discovery of benzene. It is begging the question to say that if he had not performed this work someone subsequently would have done so, and likewise it is foolish to say that Faraday's discovery merely made possible the dyestuffs industry and that others were responsible for the practical application of the benzene ring knowledge. This admittedly is so, but it cannot detract from his valuable accomplishment.

Faraday is best known for his inspiring leadership. He delved into hundreds of subjects and could not possibly have given the requisite time to complete them all. What he did accomplish, however, was to blaze the way and sustain the spirit of hundreds of followers in his own lifetime and to thousands who have followed in his footsteps. How many of us now actively engaged in the chemical industry remember that he was the first to liquify chlorine, or that as early as 1820 he conducted experiments looking to the development of stainless steel ?

In these days of magnificently housed and expensively equipped laboratories it is not amiss to call attention to the fact that Faraday and his co-workers performed wonders with pots and pans, coal stoves and oil lamps, odds and ends of every description at which the freshman chemistry student of 1931 would revolt. After all, knowledge and inspiration of the worker are the tools of greatest value—more valuable than intricate apparatus, and recognition of the ubiquitous genius of the self-made scientist of a century ago is a wholesome and fitting tribute to the man who was one of the real pioneers.

Quotation Marks

Business is to be had. Some concerns are getting ahead because they are showing energy and determination in salesmanship. They have developed new ideas and thus have stimulated trade. The need is for a more progressive sales spirit to overcome the lassitude of the buying public. There is need for directing boards and banking groups in control of great corporations to provide the men on the firing line—executives and managing heads—with the means to promote business.—*Manufacturers Record.*

In the last extreme it may become absolutely necessary for the Government to repeal the prohibition amendment, or at least so modify it to such an extent that the Government will get the income which is now the source of profit of the bootlegger.—*Financial Chronicle.*

In solving its problems, industry has found that research pays.—*Theodore Swann.*

Luck in getting orders is like luck in fishing . . . . . ninety per cent in knowing where to go . . . . . and ten per cent in going there.—*Hardware and Implement Journal.*

Industry and commerce, for their own good, must recognize that the unemployed must be provided with some work, rather than left to the costly, unsatisfactory, potentially destructive care of charity, Industry and commerce, as well as their workers, need employment. The unemployment problem is a business problem.—*Oil, Paint and Drug Reporter.*

Fifteen Years Ago

(From our issue of October 1916)

Readjustment of the financial affairs of American Dyewood Co. is further effected by organizing of the United Dyewood Corp., capitalized at $20,000,000.

General Chemical acquires eighteen acres on the south side of Chicago for a new plant.

Dye plants of the Oakes Mfg. Co., Long Island is destroyed with loss of seven lives.

Connecticut Chemical Co., Canaan, Conn., is incorporated to manufacture acetate of lime.

Pacific Coast Borax and Semet-Solvay Companies announce that they will jointly build a large plant at Searles Lake for the production of potash.

Dr. Herbert H. Dow speaks before the Bay City, Michigan, Rotary Club on the early history of the Dow Chemical Co.

Are Chemicals a "Buy"?

A Comparison of Pre-War and Present Price Levels

		1914	1921	1929	1931
Acetone, drums	lb.	.12	.12½	.15	.10¼
Acetic Acid 28%, bbls.	100 lb.	1.50	2.50	3.88	2.60
Ammonia, Anhydrous	lb.	.25	.31	.14	.15¼
Aluminum Sulfate Com. bags	100 lb.	1.10	2.00	1.40	1.25
Alcohol, denatured, drums	gal.	.34	.35	.51	.28
Arsenic, red	lb.	.12	.11	.09	.09⅜
Copper Sulfate	100 lb.	5.00	5.00	6.00	3.40
Potash Caustic 88-92%	lb.	.17[x]	.12[x]	.07⅛	.06⅛
Soda Ash 58% light, bags	100 lb.	.70	2.15	1.34½	1.15
Sodium Bichromate	lb.	.21	.07¾	.07	.07
Sodium Silicate 40° drums	100 lb.	.65	1.10	.75	.75
Sodium Prussiate	lb.	.18	.12½	.11½	.11½
Tin Tetrachloride	lb.	.34	.18	.29¾	.178
Toluol, pure	gal.	.35	.28	.40	.27
Chinawood Oil, bbls.	lb.	.09	.13½	.14	.07¾
Palm, Lagos, bbls.	lb.	.11½	.07½	.07⅞	.05

x 90% Material

WITH the 1931-1932 contract season at hand the probable trend of chemical prices is uppermost in the thoughts of both buyers and sellers. With this in mind a comparison of prices as of September 15, 1914, 1921, 1929 and 1931 is of particular significance.

Prices of sixteen important chemicals in 1931 were in all but two instances below 1929 prices, the two exceptions being anhydrous ammonia and red arsenic.

Comparison with 1921 shows 1931 prices lower in all but one item, acetic acid, 28 per cent.

Comparison with 1914 prices shows only four prices higher in 1931, acetic acid again, aluminum sulfate, soda ash, and silicate of soda.

The price level of industrial chemicals is below any other previous recent period, in good times or in bad.

Our raw commodities, the metals, sugar, rubber, grains, cotton, etc. are below 1914 levels and it is

	Approximate % 1931 prices are above or below 1929	Approximate % 1931 prices are above or below 1921	Approximate % 1931 prices are above or below 1914
Acetone, drums	−32	−18	−15
Acetic Acid 28%, bbls.	−33	+ 4	+73
Ammonia, Anhydrous	+ 9	−51	−39
Aluminum Sulfate Com. bags	− 8	−37	+12
Alcohol, denatured, drums	−45	−20	−18
Arsenic, red	+ 4	−15	−12
Copper Sulfate	−43	−32	−32
Potash Caustic 88-92%	−15	−49	−62
Soda Ash 58% light, bags	−15	−47	+64
Sodium Bichromate	unchanged	−10	−67
Sodium Silicate 40° drums	unchanged	−32	+15
Sodium Prussiate	unchanged	− 8	−36
Tin Tetrachloride	−41	unchanged	−48
Toluol, pure	−33	− 4	−23
Chinawood Oil, bbls.	−41	−42	−14
Palm, Lagos, bbls.	−37	−34	−57

interesting to note that the majority of chemical products are not only at that level, but in most instances considerably below it.

In the naval stores industry as well as the chemical prices at the moment are at figures comparable with either the deflation period of 1921 or pre-war levels. B Rosin was quoted on September 23 at $3.75 ex yard, N. Y. while the 1914 price was $4.00. Turpentine in carlots, ex dock is quoted at 37 cents against 45 cents in 1914. In shellac T. N. is currently quoted at 16 cents against 17 cents in 1914.

Buyers who refuse to wallow in the Slough of Despond, but rather, are carefully analyzing market conditions and price trends are distinctly in the minority. That minority, however, will call the markets at the turn, the remainder will wait for the upward swing to become pronounced and then rush to jump on the bandwagon only serving to accelerate the upswing.

Within the past month several instances of buyers placing two year contracts for important industrial chemicals at current prices indicates quite clearly a growing sentiment that present levels are sufficiently attractive to warrant immediate forward buying.

To say that this or that particular chemical will go up or down during the coming contract season is a highly dangerous prophecy, but common sense declares that when copper sulfate, for example, is selling thirty-two per cent below the 1914 price that the turn in that item cannot be far away.

Company Booklets

Columbia Alkali, Empire State, N. Y. City has recently issued new booklets on soda ash and caustic. In each instance the usual designation of 58% for ash and 76% for caustic has been abandoned and analyses given on the basis of sodium carbonate or sodium hydroxide content. The new comprehensive reference book is available by writing to the main office or the Chicago, Cincinnati or Dallas offices.

Glyco Products, Building No. 5 Bush Terminal, Brooklyn, has released a new booklet on emulsions. It contains a number of worthwhile ideas and technical information on practical working formulae.

Roessler & Hasslacher, Empire State, N. Y. City, a 38 page booklet on trichlorethylene, giving in minute detail the physical and chemical properties of this solvent together with information on present uses and most likely channels for further research. Copies available at any of the R & H offices.

Philadelphia Quartz, Philadelphia, an attractive 27 page booklet on sodium meta-silicate as an industrial alkali. A reprint of the address of Dr. James G. Vail, Philadelphia Quartz chemical director, before the American Institute of Chemical Engineers. A resume of technical data on this new product.

Roessler & Hasslacher, Empire State, N. Y. City, a very attractive and instructive folder on "Vat Colors and their Oxidation." A specially valuable contribution for the dyer and bleacher.

Monsanto, St. Louis, the 6th addition of "Monsanto Chemicals" a complete listing of chemicals manufactured.

Commercial Solvents, 230 Park Ave., N. Y. City, a detailed account of the physical and chemical properties of butyl lactate, normal.

We Congratulate

Robert I. Wishnick–Oct. 5th, William B. Thom–Oct. 8th
Charles H. MacDowell–Oct. 21st

The characteristics that enable a man, single handed and in the face of long odds, to make a conspicuous success in industry are not always those that endear him to his peers and rivals; and we would first congratulate Robert Wishnick upon his friends and second upon his business. Loyalty, sincerity, and modesty have been as important elements in his success as have decision, shrewdness, and perseverence. He has been not only a successful, but also a constructive factor in the pigments and fillers section of the chemical field where his company has centralized its efforts. Few know that Bob Wishnick sacrificed a right arm in the chemical laboratory, and his business friends are often ignorant of the support he gives technical societies; the encouragement he lends to chemical research; the friends he has in scientific circles.

Having reversed Horace Greely's well-known advice and come east from Wyoming, William Bouton Thom has certainly grown up with the chemical industry. At two score years of age he is one of the outstanding executives in the chemical field. He has accomplished a notable feat for his company, carrying it through the transition from private ownership by the Warner family interests, to one of the most successful of our chemical mergers. Billy Thom is famous for his shrewd judgment, his administrative ability, and his good sportsmanship. He is infamous as having been a chemistry student under Dr. William J. Hale at Michigan, and for his golf game, any time, any course. No young man in the industry has "better prospects" than he: none deserves them more.

Awarded the Distinguished Service Medal by Congress, the Legion of Honor by France, the Order of the Crown by Belgium, knighted by the King of Italy, an honorary Doctor of Science from the University of Pittsburgh, it would seem that our birthday congratulations to the distinguished president of the Armour Fertilizer works were but an anti-climax. Not so, for remembering his services at the Peace Conference, at the International Chamber of Commerce in 1923 and again in 1927, and at the first International Congress of Soil Science we would call upon his public services once more. If Charles MacDowell, with John Watson, Charles Burroughs, and Horace Bowker, would pool their experience, draw up a plan, and enforce it with all the influence of their powerful companies, the fertilizer industry, even at this late date, and in the face of deplorable market conditions, might be saved—a task, Mr. MacDowell, worthy of your metal!

What Price Recovery?*

A Defense of the Law of Supply and Demand

By Richard Whitney*

THE ancient law of supply and demand has not been abolished. Not only has it proved of primary importance in bringing on the depression, but it is also destined to be of enormous significance in the future recovery of business. It furnishes us with a touchstone to most of the grave and bewildering problems which we now face. Yet this basic law is so misunderstood, even in quarters where one would expect complete familiarity with it.

In reality, the law of supply and demand is a complex and subtle matter, with many minor exceptions, qualifications and refinements. The whole subject calls for careful and extended study by all who would pretend to understand modern business or modern governmental problems. In this brief address, however, I can only hope to deal with its simplest and most significant aspects.

According to the law of supply and demand, prices represent the relationship between the available supply and the effective demand of a given commodity. When supply exceeds demand, prices must fall. When, on the other hand, demand is greater than supply, prices must rise. Since both supply and demand are usually subject to change, the relationship between them is bound to change also, and for this reason prices are bound to fluctuate.

This much, of course, every schoolboy knows, or ought to know. But there remains a further and most important phase of the law of supply and demand which supposedly experienced persons sometimes seem to forget. Prices are not mere dead, static things. They are instead dynamic factors in business, and have a vast corrective influence upon the forces of supply and demand themselves. When prices rise, producers are naturally stimulated to increase the supply, but meanwhile demand is curtailed because the consumer's money will purchase less. On the other hand, when prices fall, the producer's profits dwindle and cause him to curtail production, but at the same time the consumer's dollar will purchase more, and thereby sooner or later demand is increased. For this reason, the free play of prices is of invaluable benefit in keeping supply and demand in a close and harmonious relationship. In the long run, it is price which tells the producer how much to produce, and the consumer how much he can buy. Almost automatically, if given free play, prices regulate both production and consumption, and in a world of constant change tend to establish fundamental economic stability. Price changes may crush our fondest hopes and our dearest illusions, but they bring us back to economic realities.

I fully appreciate the fact that this economic law sometimes works rather slowly, and also that its operation can to some extent be retarded and distorted by artificial means. But in the long run, the principle of supply and demand has a way of overcoming such temporary impediments thrown in its path. Indeed, the longer its normal course is artificially restrained, the more powerfully will it ultimately sweep them aside and follow its inevitable course. We must therefore not confuse mere temporary expediments or chance circumstances with the invariable operation of a major principle of human existence. The law of supply and demand is older than civilization itself. Not only complex and highly developed civilizations, but even the crudest savage, knowing only barter and the hunt, must obey its imperative demands. Every government or social organization must heed its dictates as a necessary price of existence. Human power and human vanity may tamper with, but can never circumvent, its operation. Being a principle of life itself, it is stronger than any business policy ever formulated. It will

*President, New York Stock Exchange
From an address before the N. Y. Merchants' Association

have its own way and take its own course. Those who obey it will be rewarded. Those who in folly oppose it will be miserably crushed.

It is, of course, vastly easier to speak of the law of supply and demand in the abstract, than to apply it to our practical problems at particular times. Nevertheless, in the large, that is the necessary program which American business faces today. But if we are to gain a proper perspective upon our present problems, we must first briefly consider the years which have gone before.

After the Armistice, the artificial war-time controls, in business were removed, and the pent-up forces of supply and demand again exerted themselves, first in a brief boom, but soon in a sharp world-wide depression. A fundamental readjustment in business was necessary, and it came. Commodity prices crashed, credit conditions were seriously impaired. The situation abroad as well as at home was in many respects more critical for the time being than it has been during the present depression.

It is instructive now to recall the reasons why the world rallied from the dark days of 1921. The recovery was not due to any single formula, or to any brilliant new idea. Primarily it occurred because of the automatic stabilizing effects of supply and demand. The only praise due to individuals is for the extent to which they originated or maintained methods for conforming more quickly and more completely to this law. On the other hand, ill-advised attempts to offset or contravene the normal results of natural economic forces brought on the unavoidable penalty. In this country, for example, the excessive amounts of credit in one way or another extended to agriculture did not succeed in saving farmers from encountering the readjustment inevitable because of the supply and demand situation. It lightened the initial shock, but only to prolong the period of depression. The same result was apparent on a more universal scale in Japan, where the cost of an attempt to stabilize business and stave off deflation was found to be a serious depression which endured several years after recovery had occurred in other countries where no such hazardous experiment had been made.

In the United States, however, the over-shadowing fact that general prosperity had returned, rendered the question of just why it had occurred a rather academic subject to most business men. As a result, the real lesson of the depression and the recovery from it went largely unnoticed.

On the other hand, there arose a widespread demand to "stabilize" and thus maintain indefinitely the prosperous conditions which existed. This was in itself an altogether natural wish. The trouble arose with the means which were employed to effect it. Both governments and private interests proceeded to peg or manipulate prices on the blithe assumption that they were thereby introducing "order" into business by "leveling off the hills and valleys" of price fluctuations. They forgot that in most commodities the basic conditions of supply and demand were constantly changing, and that prices had of necessity to change with them.

Looking back upon this period, it is striking how many of the major commodities were subjected to such attempts at artificial price-making. The coffee valorization plan in Brazil is of long standing. But it was only in recent years that Great Britain sponsored the "Stevenson Plan" in rubber; that the Canadian wheat pools attempted to stabilize wheat prices; that the Continental cartels in steel and iron and other products were established; and that similar price-fixing by private parties was attempted in copper, tin and many other commodities. Still more recently, the United States Government has undertaken to stabilize the prices of wheat, cotton and other agricultural products.

Price as a Regulating Factor

These experiments were in most cases undertaken directly in the interest of the producers, and the artificially pegged prices were therefore as a rule higher than the actual conditions of supply and demand warranted. Meanwhile, however, the cost of production was in many cases being progressively reduced by new and more efficient methods and machinery. An unnatural premium was thus placed upon increasing production, which was for the time being very pleasant and agreeable to producers. They overlooked, however, the function of prices as regulators of supply and demand, and the inevitable tendency for high prices to stimulate production.

For several years, the general levels of commodity prices presented a deceptive appearance of evenness and stability. It is true that in the normally open markets, occasional tendencies toward lower prices reflected the true condition of supply and demand. These only led to attacks on the markets themselves, and sometimes to the imposition of arbitrary restraints upon their ability to reflect the actual economic situation. Also, the temporary stimulation of production thus brought about was for the time being matched with an equally artificial bolstering up of consumption—especially through the extension of installment purchasing. But the law of supply and demand was not to be so easily circumvented. Its operation was delayed, not abolished. In the end, the over-stimulated production overwhelmed the world's markets and precipitated a violent readjustment in commodity prices which has borne world-wide depression in its wake.

During the years before the panic, there was another important kind of interference with the law of supply and demand, operating in international trade through rising tariffs, allocations of imports and exports, discriminating taxation and even embargoes. Its background was the World War which induced

almost everywhere a rising tide of nationalism. Whether through fear of future wars or through new conceptions of national prosperity, there was manifested an extraordinary effort in almost all countries for economic self-sufficiency. All over the world, there arose new and more serious obstacles to international trade, and artificial aids to the domestic producer at the expense of the consumer. The effect of this world-wide tendency was again to increase and maintain high prices in the face of basic economic conditions. Higher prices of course carried with them the dangerous tendency to curtail consumption. It is therefore not astonishing that in the long run a point was finally reached when the mountain volume of production could not find sufficient buyers, and that in the end commodity prices fell with a crash. Once again the law of supply and demand, artificially constrained for a time, took its revenge. Other similar cases could be cited, where liberties had been taken with the economic realities, and these also were contributing causes of the depression.

It is wholly misleading to view the depression as a disease. In reality it is an inevitable though drastic readjustment from folly and illusion to wisdom and reality.

If the world had paid more heed to the law of supply and demand, if natural rather than artificial price-making had been consistently fostered, if sound economic knowledge and experience rather than human vanity and shortsighted selfishness had formulated the policies of governments and of business everywhere, no such violent readjustment would have been necessary. In our blindness, we denied the truth, but to our cost we have discovered that the truth is mighty and will prevail.

Economics and Public Opinion

Economics is not a purely mechanical and mathematical science. It deals with human relationships, and it is constantly pervaded with very human hopes and fears. To foresee future economic conditions, one would have to be able to predict not only cold, impersonal statistics, but also public opinion. Many instances of these psychological factors in business could be cited during the last few years. The crash of commodity prices and production, together with the stock market panic, at first confused and bewildered the public. So great had been the optimism engendered during the boom, that for months public opinion stubbornly remained blind to economic facts. When it finally gave way to general pessimism and alarm, these new moods were all the darker because of the contrast with the totally different state of mind which had preceded them. Undoubtedly, from the perspective of 1940, the extreme optimism of 1929 and the unmitigated gloom of 1930 and 1931 will appear equally exaggerated and ridiculous.

Mass emotion of this sort is actually generated by major changes in prices, which themselves are caused by economic readjustment. This explains why it is that just when optimism is at its height, danger impends, and that just when pessimism is deepest, readjustment toward more favorable conditions is already powerfully under way.

Back to Natural Economic Conditions

The depression in business, and the fear complex in public opinion, then, have resulted from an economic readjustment necessitated by the previous liberties which were taken with supply and demand. The sooner, therefore, the policies and actions of our governments and our business enterprises can be put into harmonious accord with natural economic conditions, the more quickly this inevitable readjustment will be completed, and prosperity will return. The surest way to continue the depression is to prolong the need of readjustment, through homeopathic attempts to cure economic ills by interjecting into them more of the attempted interference with supply and demand which originally caused them.

Yet this view is constantly challenged by those who advocate the employment of arbitrary methods of stabilization. Considering business as essentially a meaningless and disorderly process, such men demand artificial policies for limiting production, for stimulating demand, and even for price-fixing and price-manipulation. The specific forms which this general attitude toward business takes, are legion. But underlying them all is a conception of supply and demand, and of prices, as passive things which can be moulded to their hearts' desire. The self-correcting tendencies of prices, and the inevitable influence of prices upon both production and consumption are ignored. Sometimes, for example, they will attempt to hold up or even to raise prices, but ignore the fact that this step will necessarily and unduly stimulate production. In the end, however, they are sure to learn that they are operating, not upon a corpse, but upon a living organism.

It is true that the law of supply and demand is not simple but complex in its practical operation, that it sometimes exerts its influence quite gradually, and that a certain amount of interference with it in minor details is inevitable. Also, in times of depression, there is a dramatic appeal to mere activity, whether wise or foolish. A policy of *laissez-faire* is apt to seem negative and hopeless—a confession of failure. There is always a great temptation to "do something," even if it is quite the wrong sort of thing, and in reality only tends unnecessarily to delay the recovery.

There has been much criticism of the seeming inertness with which American business has faced this depression. I am not sure that in reality this passive attitude may not, in the main, have been

rather wise. Obviously a major readjustment has had to take place. The fact that we have let nature take its course, may augur well for the ultimate prosperity of the country. The less we needlessly exhaust ourselves trying to swim against the tide, the more rapid progress we will be able to make when the tide itself turns.

Waste can and should be eliminated, by-products fully utilized, invention stimulated and better products perfected. Hard work and constructive thought, rather than idle lamentations or the pursuit of futile panaceas, must be the order of the day. All such efforts are in fundamental harmony with the law of supply and demand. They constitute the methods by which America has successfully met the challenge of depression many times before, and can meet it again. But the injection of artificial measures to stimulate or depress the normal effects of supply and demand requires the utmost skill and care. Such experiments must correctly anticipate future normal trends, or they will merely interject into the situation an additional distortion which, by requiring further economic readjustment, may well lengthen the depression and retard the recovery from it. This danger is all the greater because of the fact that, in most cases of so-called "stabilization," there are quite selfish interests at stake, and in consequence an almost invariable tendency to seek selfish advantages by any plausible means.

Readjustment Affects All

American business is an organic whole, not a bundle of separate and independent parts. The great cyclical waves of prosperity or of depression strike the whole structure. All must therefore share in the readjustment through which the country is now going. The law of supply and demand is no respector of particular groups or special motives. Everyone must pull his own weight in the boat. There should be no favored classes or privileged industries. The retailer cannot hope to maintain his own prices when the prices at which he can purchase have fallen. Wages must justify themselves on the basis of production and performance; one class of wages cannot be held up so that the recipients can unfairly obtain increased purchasing power brought about by wage reductions in other quarters. Attempts to help one industry at the expense of others, or one section of the country at the expense of other sections, must be avoided. We cannot hope to re-establish any sound or lasting prosperity, if we create in American business life a set of Robin Hoods to steal from one class in order to give free alms to another. Such practices as these are of course unfair in themselves. But what is more, they create an uneven and unsound foundation for future prosperity, by producing distortions in prices, and derangements in the forces of supply and demand, which in the long run necessitate further serious and critical readjustments.

Finally, if we are to speed the ending of depression and to recover prosperity which will last, we must not conceal or hinder the free and open expression of the forces of supply and demand in our market places. There has been, I feel, too much subterfuge in this regard, and too little frankness. It is futile outwardly to maintain nominal prices and secretly engage in price-cutting, to hold up high nominal rents and then nullify them by granting large concessions of free occupancy, to keep up a wage scale that looks high on paper and at the same time to lay off the help half of each week. In the long run, such subterfuges deceive nobody, and are only a hindrance to readjusting our prices to levels which will move goods, permit employment and bring back general prosperity.

The integrity of prices as the natural expression of supply and demand, and the natural regulators of production and consumption, should be safeguarded from well-intended yet dangerous and uneconomic interference. Those who would manipulate prices in the supposed interest of prosperity, are only too apt to attempt to weaken or destroy the free and open markets for the crime of telling the truth.

Perhaps the most obvious case of this sort has occurred in connection with the wheat market. In a vain and costly attempt to "stabilize" wheat prices in direct defiance of the conditions of supply and demand, our wheat market has been subjected to special restrictions and its normal price-making facilities to distortion. Yet these fallacious steps have neither afforded prosperity to wheat farmers, nor held up the price of wheat, which has recently sold lower in Chicago than at any period during the twentieth century, and in Liverpool than at any time for three hundred years.

But meanwhile we may rest assured that the fundamental law of supply and demand was not suddenly abolished a few months ago. It is still working vigorously in our midst. It has compelled a major recession in prices, accompanied by business depression. But once this readjustment is completed, the same economic forces will operate in the same direction as our human hopes and aspirations, and will usher in more favorable conditions. It remains for us to heed the principle of supply and demand, to govern our actions in accordance with its dictates, and thereby to hasten the restoration of a prosperity based upon the sound and lasting foundation of natural law.

Official figures show production of nitrogenous fertilizers in France last year as 502,000 tons, against the 380,000 tons of 1929. In terms of actual nitrogen content the increase was from 75,800 tons to 97,800 tons. Of the total production of 1930, 363,000 tons were represented by ammonium sulfate, of which 223,000 tons were synthetic, 104,000 tons "from the working up of residues", and 30,000 tons from gasworks. The other products manufactured in 1930 included 70,000 tons of cyanamid and 52,000 tons of calcium nitrate.

New By-Products from Gas*

Flotation Sulfur and the Thiocyanates are now commercially produced in Gas Manufacture

By D. L. Jacobson**

NEW methods for the purification of manufactured gas, widely adopted in all parts of the country, have brought with them new by-products of commercial importance. A new form of sulfur is being marketed in large quantity. "Flotation Sulphur" is extremely fine in particle size and of extraordinary reactivity. A new source of the thiocyanates or sulphocyanates is available to the chemical markets, with ammonium thiocyanate as the starting point. This material is an important basic material in the manufacture of transparent and light-colored resins and molded products. New uses for the thiocyanates are being developed actively.

Methods of Gas Purification

Previous to 1921, the removal of hydrogen sulfide from gas was effected entirely in large boxes containing iron oxide, a solid dry material. The purification method was cumbersome and laborious, and the installations occupied a large part of the gas plant area. Starting in 1921 The Koppers Company of Pittsburgh introduced a new system of gas purification employing liquids as the purifying agents. In these liquid purification plants, the reactions are much more rapid. The new purification plants occupy a much smaller ground space and are modern and practically automatic in method of operation. Since 1921, seventy-three liquid purification plants have been installed with a capacity for purifying over six hundred million cubic feet of gas daily.

The liquid purification plants remove both hydrogen sulfide and hydro-cyanic acid from the gas, the principal purpose of the removal being the improvement of the quality of the gas. At the same time, in those purification plants which employ the sulfur recovery types of liquid purification, important by-products are recovered; the credit for these by-products reduces the net cost of gas purification. The hydrogen sulfide in the gas is converted into sulfur and may be produced in the form of "Flotation Sulfur", or if the Thylox process is used, in the form of commercial brimstone. The hydrocyanic acid in the gas may be recovered as sodium thiocyanate, or in a special process described below, in the form of ammonium thiocyanate. Part of the sulfur may also be recovered as sodium thiosulphate (commercial "hypo").

Manufacture of "Flotation Sulfur"

There are three types of sulfur recovery liquid purification plants, employing the Thylox, Ferrox and Nickel processes respectively. The apparatus used in these three processes and the operation is identical, but the solution or suspension used is varied. As a result the composition of the sulfur produced varies somewhat, depending on the process used.

In all the sulfur recovery processes, the gas is brought into contact with the purifying solution or suspension in a gas scrubber or absorber, this contact resulting in the absorption of H_2S and HCN from the gas. The foul solution or suspension is then regenerated by air oxidation in an oxidizer called the "thionizer". The oxidation reaction results in the liberation of free sulfur, which is floated off into a "slurry tank" as a thick sulfur suspension. The sulfur slurry is filtered, usually on a continuous suction filter, producing sulfur cake, a paste with about 50% moisture.

*A Contribution of The Koppers Research Corporation.
**Chemical Engineer, The Koppers Research Corporation, Pittsburgh, Pa.

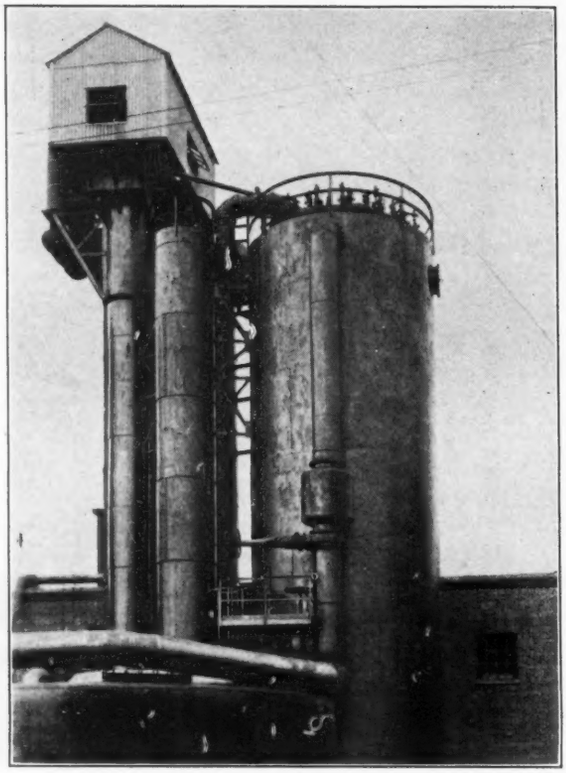


Fig. 1. Thylox liquid purification plant at Racine, Wis. Left to right, Thionizer, sulfur slurry tank, absorber. Below, Fig. 2. Thylox sulfur cake on continuous filter

Fig. 1 shows the Thylox liquid purification plant at Racine, Wisconsin, with a capacity for purifying 10,000,000 cubic feet of gas per day. The absorber, thionizers and slurry tanks are shown. Fig. 2 shows a continuous filter press with Thylox sulfur paste on the filter leaves. The autoclave shown in Fig. 3 is used to melt the sulfur cake into commercial brimstone where this type of sulfur is in demand.

The purification solution contains some sodium thiosulfate and sodium thiocyanate in solution, so that the sulfur cake on the filter press contains a certain amount of these salts. The sulfur cake is processed further by certain washing operations. so as to produce a sulfur product which is very low in these sodium salts. The washed sulfur is then ready to be shipped as Flotation Sulfur for its various uses. A dry Flotation Sulfur dust is also produced by passing the wet sulfur product through certain heat drying operations.

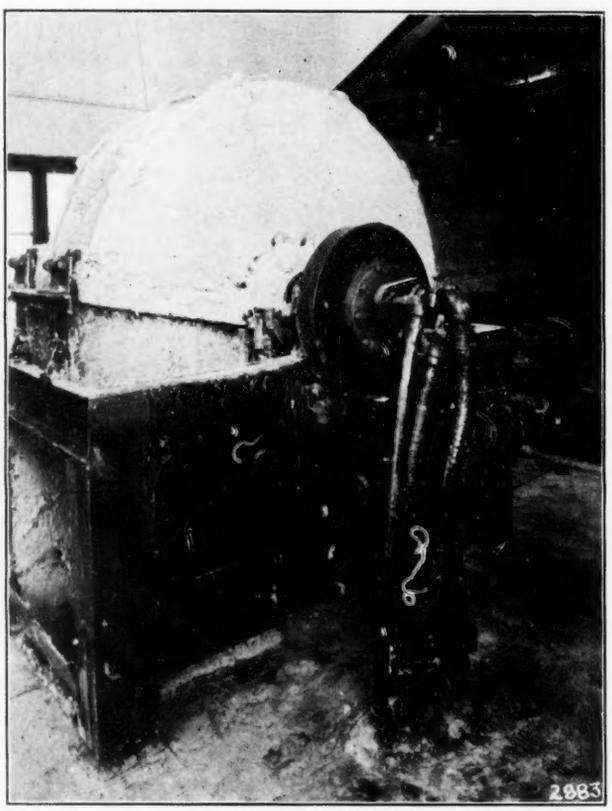
The sulfur produced in the Thylox and Nickel processes is practically pure sulfur (on a dry basis). Ferrox sulfur contains a varying amount of iron oxide, in addition to a high percentage of sulfur. Flotation sulfur of all three types is sold commercially.

Properties and Uses of Flotation Sulfur

Flotation sulfur is produced by chemical oxidation as described above. The conditions of its production are such that an extraordinary material results. This new form of sulfur is extremely fine in size and highly active. This may be readily seen by examining the micro-photographs of Fig. 4, 5, and 6, showing various forms of sulfur, magnified one hundred times. The Flotation Sulfur is considerably finer than either ordinary commercial precipitated sulfur or three hundred mesh ground sulfur dust. The difference between flotation sulfur and other commercial forms of sulfur is very striking.

The principal use of flotation sulfur which has been developed commercially is its application as an agricultural fungicide. This material has been thoroughly investigated by the Crop Protection Institute, an impartial organization sponsored by the National Research Council, and by a large number of agricultural experiment stations, with uniformly favorable results. Flotation sulfur is a highly powerful fungicide for use by the orchardist. It is agreeable to the men who actually do the spraying, as it does not possess the irritating properties of previous forms of sprays. Flotation sulfur is sold in large quantities in various parts of the United States. Some of the more important applications are in the control of apple scab, peach brown rot and in diseases of the cherry, gooseberry and in numerous other fungus conditions.

The photographs of Fig. 7 and 8 illustrate the results obtained in an orchard test using flotation sulfur. Fig. 7 shows an untreated apple tree and a sample of badly scabbed fruit taken from it, while Fig. 8 shows a tree of the same age in the next row of the same orchard, which had been sprayed with sulfur, and also shows the excellent fruit obtained.



Flotation sulfur is marketed in three forms—as a wet spray, as a "wettable" dust, and as a dry powder for dusting.

Other uses for flotation sulfur are being investigated. The extreme fineness (90% of particles are 1 to 3 microns in diameter) and other special properties suggest important applications in the chemical and biological fields.

Thylox Sulfur Soap

Thylox-Sulphur Soap contains as its principal ingredients a high-grade soap and a considerable percentage of pure Flotation sulfur. This soap combines the established therapeutic qualities of active Flotation sulfur with the cleansing properties of soap. It has been carefully tested under medical supervision, and the results of these tests have attracted a great deal of public interest. The soap is efficient as a shampoo for the hair and scalp, and has proved to be of distinct value in the treatment of certain skin disorders.

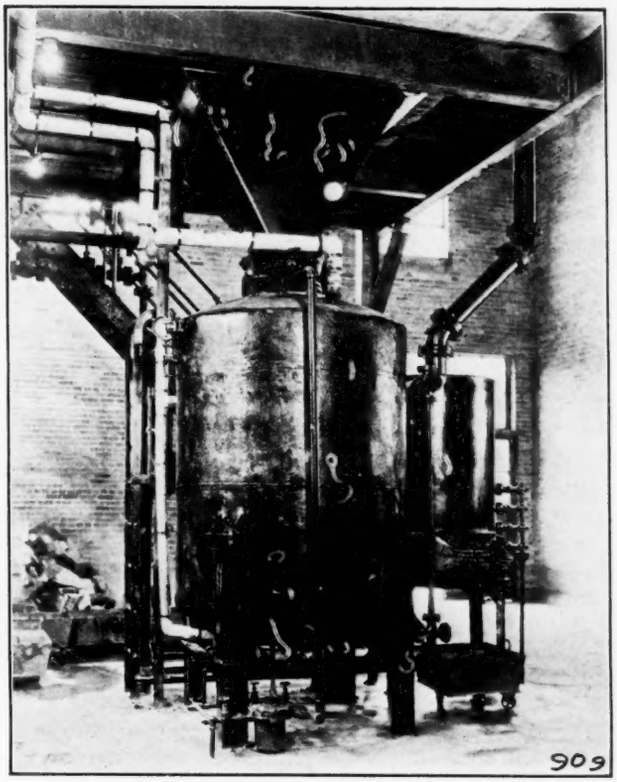


Fig. 3. Autoclave for melting Thylox sulfur into brimstone

Manufacture of Ammonium Thiocyanate

Hydrocyanic acid, which is present in manufactured gas, may be removed simultaneously with the hydrogen sulfide in a single absorption operation, as described above; or else, it may be removed in a separate operation preceding the liquid purification plant. If the removal is carried out in the liquid purification plant, the gas is treated in the absence of ammonia; a mixture of sodium thiocyanate and thiosulphate results, derived from soda ash used in the process and the H_2S and HCN present in the gas. This sodium thiocyanate may be used as a starting point in the manufacture of various thiocyanates. However, it is preferable to produce the thiocyanates from ammonium thiocyanate as described below.

When the hydrocyanic acid is removed in a separate absorber preceding the liquid purification plant, several advantages are gained. The removal of the HCN in the thiocyanate scrubber results in a considerable saving of soda ash in the liquid purification plant, and (if the Ferrox process is used) reduces the cost of Ferrox replacements. At the same time, the ammonium thiocyanate produced is practically free from thiosulphates, facilitating the production of pure thiocyanates.

The production of a strong ammonium thiocyanate solution (30%–35% NH_4SCN) in the gas plant is carried out as follows: The gas, containing ammonia and HCN is brought into contact with an ammonical aqueous solution containing sulfur in suspension in a gas scrubber, similar to the absorber in the liquid purification plant. This suspension is recirculated continuously, concentrated ammonium thiocyanate solution being drawn off as produced. About 95% of the HCN is removed from the gas in this operation. The sulfur produced on the filter in the liquid purification plant may be used to supply the requirements of the thiocyanate scrubber. The NH_3 and HCN present in the gas combine chemically with the sulfur in the suspension to form ammonium thiocyanate. The concentrated NH_4SCN solution is then ready for further operations to produce crystalline ammonium thiocyanate.

The production of crystalline ammonium thiocyanate from the strong ammonium thiocyanate solution is carried out in apparatus constructed of non-ferrous corrosion-proof metal. The operations involved are evaporation, filtration and crystallization. The product is technical ammonium thiocyanate, containing about 95% NH_4SCN, less than 1% ash (sodium salts), and about 4% of water (on a dry basis about 99% NH_4SCN). A still purer product is also produced by removal of traces of iron and recrystallization.

The apparatus used in a semi-commercial plant for the manufacture of ammonium thiocyanate is illustrated in Fig. 9.

Properties and Uses of Ammonium Thiocyanate

The recovery of ammonium thiocyanate from manufactured gas, as outlined above, provides a large and reliable source of thiocyanates for the consuming markets. Ammonium thiocyanate is used as the starting point in the manufacture of transparent resins and also for the manufacture of various inorganic and organic thiocyanates and isothiocyanates.

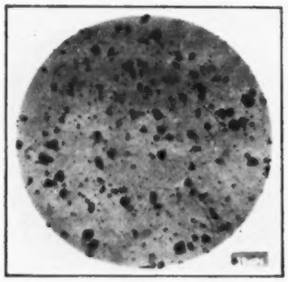


Fig. 4. Ordinary ground sulfur dust, magnified 100 times

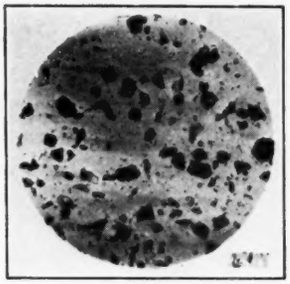


Fig. 5. Ordinary commercial precipitated sulfur flakes magnified 100 times

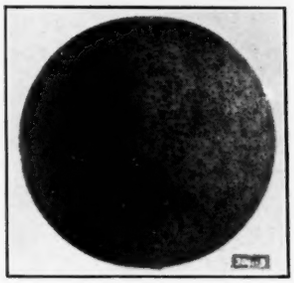


Fig. 6. Flotation sulfur magnified 100 times. Note fineness by comparison

An ammonium thiocyanate gas scrubber handling five million cubic feet of gas per day has been in operation for a considerable period of time at the plant of the Rochester Gas and Electric Company of Rochester, N. Y., which is cooperating with The Koppers Research Corporation in this new development.

The thiocyanates, while derived from hydrocyanic acid, do not have the poisonous properties of the cyanides. In fact, the thiocyanates are used to some extent as internal medicines. The thiocyanates are also called sulfocyanates and sulfocyanides.

Chemicals in Resin Manufacture

Ammonium thiocyanate (NH_4SCN) crystalizes in plates or prisms as a colorless (white) salt. It is highly soluble in water (62% solution at 20°C.), a strong cooling effect being produced on dissolving the salt. Ammonium thiocyanate is also readily soluble in alcohol, pyridine, acetone and other solvents. The salt is hygroscopic and deliquescent in nature, so that it should be stored in containers protected from humid atmospheric conditions.

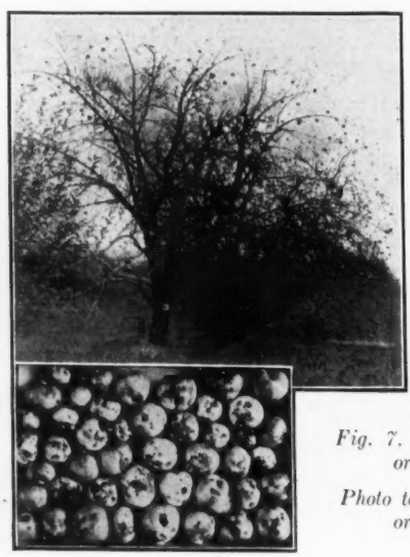
The principal uses for ammonium thiocyanate are (1) for conversion into thiourea which is used in the manufacture of transparent resins, (2) as a starting point for the manufacture of other thiocyanates, such as calcium thiocyanate and lead thiocyanate, etc. There are many other commercial uses for the salt, and some of the new uses may develop into greater prominence, now that a new commercial source of the thiocyanates is available. One of the most promising among these is its use as weed-killer.

Uses for Ammonium Thiocyanate

Ammonium thiocyanate is used in textiles, in the dyeing and printing of fabrics. It is added to the dye bath contained in copper vessels, to avoid the dye being contaminated and adversely affected by the copper. It is used to increase the strength of silks weighted with tin salts; also for the prevention of red spots in silks weighted with tin salts. Ammonium thiocyanate is used as an ingredient of freezing solutions in conjunction with nitrates. In metallurgy, it is used to produce grayish black coatings on zinc. It is used as a starting point in the manufacture of guanidine, also in the manufacture of cyanides and ferrocyanides. It is used in photography for several purposes; and also in explosives composition. Guanidine also forms resins by reaction with aldehydes, in a similar way to thiourea.

Thiourea and Thiourea Resins

Ammonium thiocyanate is converted to thiourea by heating the technical salt up to temperatures of 140 to 160°C. for several hours. The operation is carried out in non-ferrous corrosion-proof apparatus, under ordinary pressure or vacuum. A single operation converts about 25% of the thiocyanate into thiourea, however, the remaining thiocyanate is reworked in further operations. After the conversion, the thiourea is separated



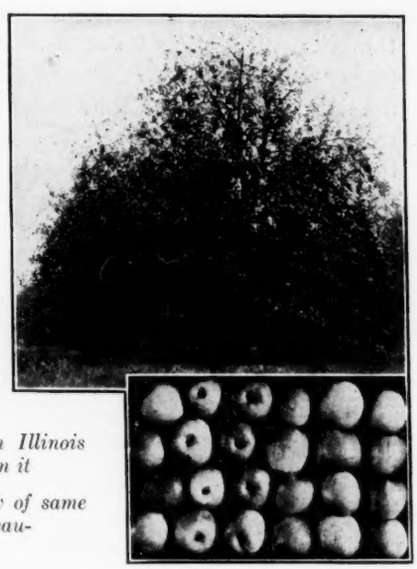


Fig. 7. Photo of untreated apple tree (Ben Davis) in Illinois orchard and sample of badly scabbed fruit taken from it

Photo taken same time, of tree of same age in next row of same orchard, sprayed with Flotation Sulfur. Note the beautiful foliage and Grade A fruit

from the ammonium thiocyanate by certain extraction, centrifuging, filtering and crystallizing operations. The technical thiourea produced contains about 95% thiourea, less than 1% ammonium thiocyanate, the rest being water (on a dry basis about 99% thiourea). The conversion reaction is a molecular rearrangement:

$$NH_4SCN \rightleftharpoons SC(NH_2)_2$$

Thiourea, also called thiocarbamide, is a colorless (white) crystalline salt, moderately soluble in water (about 9% solution at 20°C.), the solubility increasing rapidly with temperature. (At 50°C., about 30% solution.) It is also moderately soluble in pyridine, but only slightly soluble in ether, and in cold, strong alcohol; it is soluble, however, in hot alcohol. It is weakly basic in reaction, and combines with acids to form salts. Thiourea has the power of dispersing cellulose in the presence of alkalies and may be used in the manufacture of artificial silk.

Thiourea condenses with formaldehyde to form transparent, colorless resins. Resins are also formed from thiourea combined with acetaldehyde, acrolein, alcohols, ketones, etc. These resins are used in molding powders and in lacquers and varnishes. Various other uses for thiourea are in the manufacture of vulcanization accelerators, in photography, in the manufacture of liquid glue, in explosives (thiourea-perchlorate), in flotation and as a corrosion inhibitor for iron. Thiourea is a starting point in the synthesis of important dyestuffs and pharmaceuticals. It is also used for the treatment of weighted silks (Gianoli process).

One of the most important uses for thiourea is in the production of thiourea-formaldehyde molding powders which are used to produce transparent and light-colored molded products. These molding powder are superior to phenol molding powders, wherever transparency or colors, especially light or pastel colors, are desired. Many beautifully colored products, either transparent or opaque, may be produced with thiourea powders.

The thiourea molding powder is usually used in mixture with the cheaper urea-formaldehyde powder which has somewhat similar properties. The thiourea resin is, however, more resistant to moisture than the urea resin, the thiourea powder being capable of withstanding boiling-hot water. The addition of the thiourea powder is therefore highly advantageous.

In manufacturing colored or transparent molded products, the procedure is the same as with the phenol powders. The temperature must, however, be lower and the die must be "gassed" to prevent blisters. The usual fillers and coloring matter are mixed in. In using the thiourea powder, the dies are made of stainless steel or chromium plated.

Fig. 9. View in semi-commercial plant for the manufacture of ammonium thiocyanate

The thiourea-urea products excel especially in the lighter and pastel shades.* The molded articles are considerably stronger than the phenol products and a thinner wall may be used.

Calcium thiocyanate is manufactured by treatment of ammonium thiocyanate with lime, distilling off the ammonia. The pure salt is a white hydroscopic crystalline powder of the formula $Ca(SCN)_2.3H_2O$. Technical calcium thiocyanate is a thick deliquescent pasty solid of yellowish tinge. It is very soluble in water, also in hot alcohol. The material is usually supplied commercially in the form of a concentrated yellowish solution.

Calcium thiocyanate has some remarkable properties which promise important commercial markets for this product. It has the ability to disperse the various forms of cellulose, and its use in the manufacture of artificial silk, of vulcanized fibre and parchmentized paper is the subject of considerable development work. Its use in the filling of fabrics is also being investigated.

Calcium thiocyanate may also be used for the manufacture of ferrocyanides, and in dyeing to produce madder effects on wool.

Sodium thiocyanate may be recovered from all the liquid purification processes, by a process of crystallization in which it is separated from the sodium thiosulphate present in the purification solution. Potassium and sodium thiocyanates may also be prepared by reaction between potassium carbonate or sodium carbonate and technical ammonium thiocyanate. These salts are colorless (white) deliquescent crystals, easily soluble in water, alcohol and acetone. They are used in the preparation of organic thiocyanates and isothiocyanates (mustard oils), in the dyeing and printing of textiles, and in medicine.

These metallic thiocyanates may be prepared by precipitation from ammonium thiocyanate, using the soluble metal salts respectively. These insoluble thiocyanates find use in the field of explosives and pyrotechnics, and in dyeing and textile work. Lead thiocyanate is used in safety matches. Copper thiocyanate is used in a paint for the bottom of ships. Mercury thiocyanate is used as an intensifier in photography.

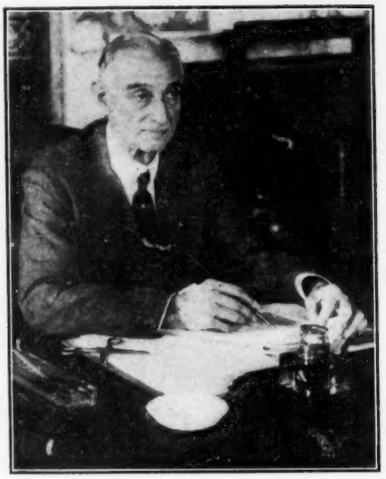
Artificial mustard oil is allyl isothiocyanate, formula $CH_2{=}CH{-}CH_2.NCS$. This compound is formed when allyl thiocyanate is heated under suitable conditions. Allyl thiocyanate may be prepared using potassium or sodium thiocyanate as a starting point.

Many new organic thiocyanates and isothiocyanates may be synthesized which have promising uses as pharmaceuticals and in similar fields. In a new method of synthesis,** the organic substance (such as aniline) is treated in the cold, in a strongly acid solution of NaSCN, with bromine. Thiocyanogen, formula $(SCN)_2$, is generated in the reaction. Many new and interesting organic thiocyanates may be produced by this method.

*See article by C. E. Slaughter on plastics, Dec. 1929 p. 706.
**See H. P. Kaufmann and W. Oehring Chemical Abstracts 1926 V. 20 p. 1603

Foreign News

Foreign trade papers, specially the English ones have devoted considerable space to comments on the new National Government in Great Britain and the effect of the acute financial crisis on the trade situation. Lord Reading, prominent member of the I. C. I. Board of Directors and close confident of Sir Harry McGowan has temporarily forsaken the test-tube for a triumphant return to political life as a member of the emergency cabinet.



Lord Reading, I. C. I. Director, and now English Cabinet Member

Trade and prices remain at a low ebb. While synthetic nitrate producers have withheld prices for next year sulfate of ammonia has fallen to £4 15s. per ton. Agitation is rife in financial circles for an airing of the conditions under which Lautauro was brought into the "Cosach" and for a new deal for the stockholders.

Accompanying the announcement of the reduced schedule of prices for nitrogenous fertilizers, the German Nitrogen Syndicate makes a strong appeal to home buyers for support. The Syndicate points out that despite concessions made, they are unable to reach the levels of material which has been recently dumped on German markets following the breakdown of negotiations. Per kilog. of nitrogen content for home market consumption: Sulfate of ammonia, type 1, has been reduced by 4 pfennigs; type 2, by 6 pf.; ammonium chloride, by 6 pf.; Kalkammon, by 6 pf.; ammonium sulfate nitrate (Leuna saltpetre), by 6 pf.; ammonium sulfate nitrate (Montan saltpetre), by 3 pf.; lime ammonium nitrate, by 4 pf.; potash ammonium nitrate, by 2 pf.; cyanamide, by 4 pf.; lime nitrate, by 2 pf.; and sodium nitrate, by 4 pf.; For the whole of the Nitrophoska range the price has been reduced by 25 pf. per 100 kilogs. of product. The more important actual present prices per kilog. of nitrogen are: Ammonium sulfate, type I., 0.74 rm.; type II., 0.68 rm. urea, 0.82 rm.; cyanamide, 0.69; lime nitrate I. G., 0.93; and sodium nitrate, 1.11. These prices are for 15-ton lots f.o.b. buyers railroad station.

The price changes in recent years are shown in the following table:

1924-25	78.9	1928-29	67.2
1925-26	75.6	1929-30	64.4
1926-27	70.7	1930-31	62.1
1927-28	67.5		

For the year 1931-32 the index will probably show a further decline to 60.

In England interest centered in the Faraday Celebration. The discoverer of benzene and its derivatives is being honored by the English government and by chemists from the four quarters of the globe.

Aluminum Cartel to End?

According to information from the Continent, the International Aluminum Cartel, which comprises the most important producers in England, Germany, France, Switzerland, Austria and Norway, is expected to come to an end at the close of this year, when the agreement expires. The chief reason is attributed to the expansion of American aluminum interests.

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CHEMICAL N

Photographic Record of

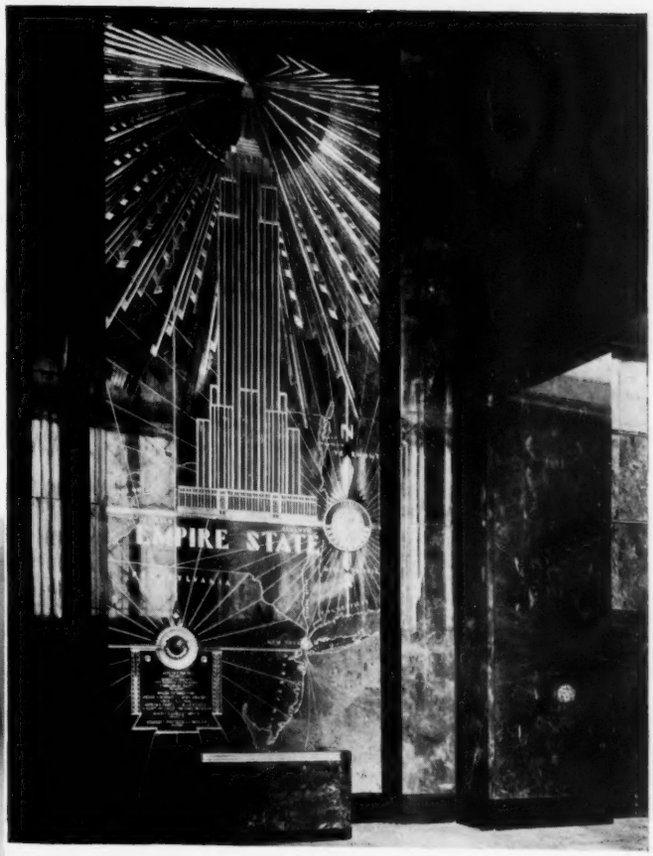
Until a few years ago the fashional chemical residental section centered at Platt, Beekman and William Streets in New York. Firms manufacturing and dealing in drugs, chemicals and allied lines were located downtown,

clustered tightly together around and to the south of the entrance to Brooklyn Bridge. Warehouses and light manufacturing occupied same buildings as offices. Executive and sales quarters were cramped and uncomfortable judged by modern standards. Slow disintegration occurred with the general trend uptown. Empire State, highest office building in the world, is the medium of once again bringing together the chemical industry in New York. Above, the beautiful private office of Eli Winkler, dean of the alkali industry and now executive vice-president of Columbia Alkali, first chemical company to enter Empire State; left, the directors' room of R & H; below a typical executive office of the large du Pont suite

NEWS REEL
of Chemical Activities

A New Chemical Center

In the Making at the Empire State in New York City



What thoughts must run through the minds of older executives of Monsanto, E. C. Klipstein, E. M. Sargent, du Pont and Grasselli as they enter the magnificently appointed lobby of Empire State and are whisked swiftly and silently to their respective destinations in sumptuous elevators rising several hundred feet a second. Memories of hesitant lifts, dark, wooden stairs and drafty offices must more than compensate for the "good old days", specially when such pleasant offices as these await them. Left, general offices of E. C. Klipstein & Co., and below the private office of H. P. Johns, eastern manager for Grasselli and one of the best known and liked executives in the industry. "Uncle Herman" as he is intimately and lovingly called by his associates in Grasselli could not be persuaded for his extreme modesty, to add the warmth that an appearance "in person" would give to the picture below

The Alchemist
by
David Teniers
The Younger (1610-1690)

Reproduced through courtesy of the John G. Johnson Art Collection and the Pennsylvania Museum of Art in Philadelphia.

and today . . . *many of his visions have materialized*

MODERN chemistry has produced marvels as remarkable in many respects as the transmutation of base metals into gold. The invention of synthetic textile fabrics; the hydrogenation of oils; the exact duplication of nature's flavors and spices; the development of nitrocellulose lacquers and a multitude of brilliant colors to beautify man's surroundings . . . these are but a very few of the hundreds of revolutionary accomplishments of chemistry.

Realizing that persistent and painstaking research furnishes the motive power for new developments, Monsanto has always emphasized this phase of its operations. Complete laboratories are maintained at all of the Monsanto works. Hundreds of chemists, armed with every modern appliance, follow the path begun by the ancient Alchemist, seeking new chemical worlds to conquer. The "Romance of Chemistry" is still with us . . . may it continue to flourish.

MONSANTO'S 200 PRODUCTS
include a complete list of Medicinals, Fine Chemicals, Heavy Chemicals, Intermediates, Lacquers and Chemicals for Rubber.

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Monsanto Chemical Works
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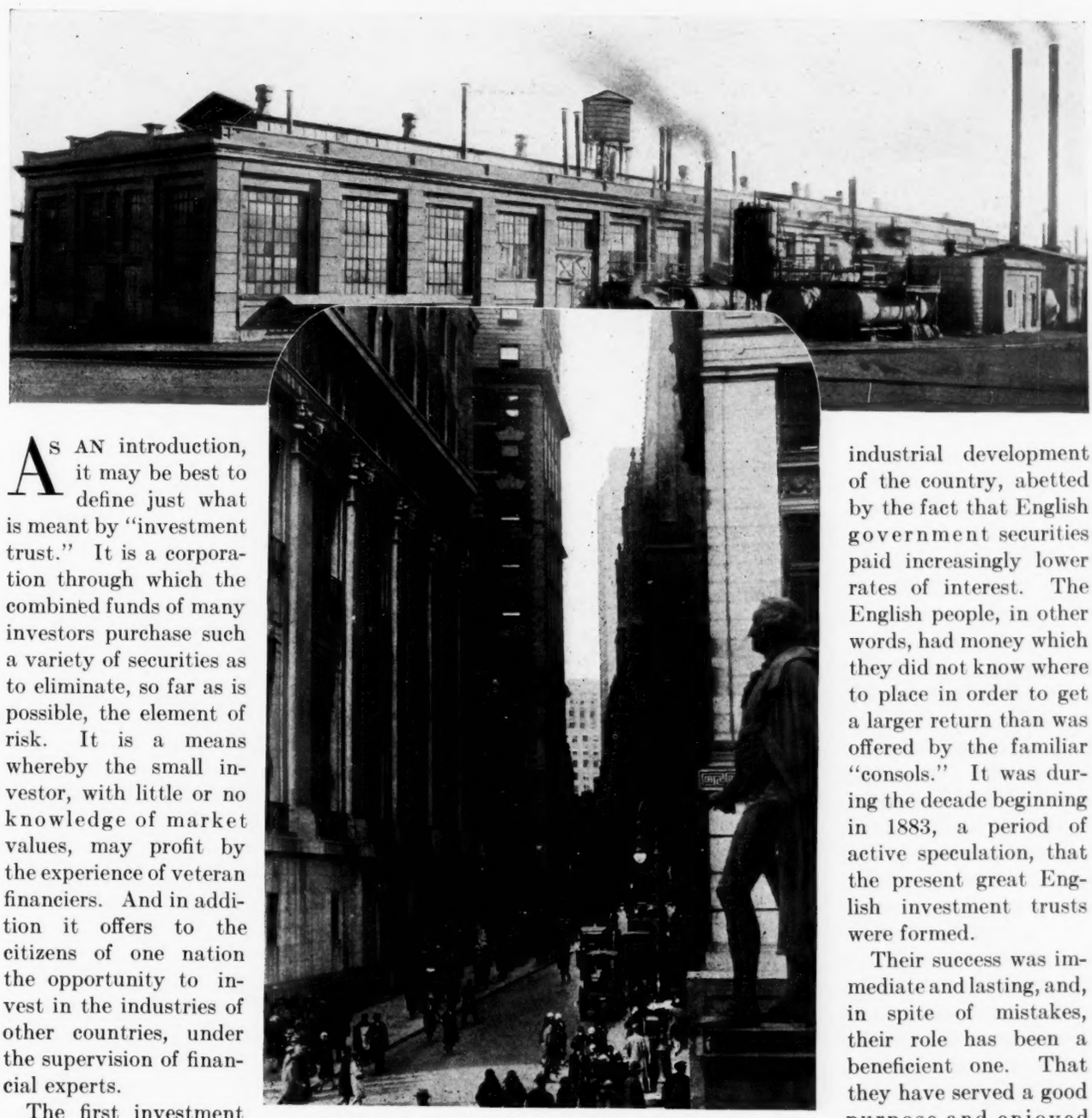
Monsanto CHEMICALS OF QUALITY Monsanto ST. LOUIS, U.S.A. **Chemicals**

Chemical Holdings of the Investment Trusts

A Financial Appraisal of the Industry as Revealed in the 1931 Portfolios

By F. A. Hessel



AS AN introduction, it may be best to define just what is meant by "investment trust." It is a corporation through which the combined funds of many investors purchase such a variety of securities as to eliminate, so far as is possible, the element of risk. It is a means whereby the small investor, with little or no knowledge of market values, may profit by the experience of veteran financiers. And in addition it offers to the citizens of one nation the opportunity to invest in the industries of other countries, under the supervision of financial experts.

The first investment trusts were formed in England during the latter half of the nineteenth century. They were brought about by the rapid growth of capital, resulting from England's position as the great creditor nation, and from the intensive industrial development of the country, abetted by the fact that English government securities paid increasingly lower rates of interest. The English people, in other words, had money which they did not know where to place in order to get a larger return than was offered by the familiar "consols." It was during the decade beginning in 1883, a period of active speculation, that the present great English investment trusts were formed.

Their success was immediate and lasting, and, in spite of mistakes, their role has been a beneficient one. That they have served a good purpose and enjoyed great prestige is, perhaps best shown by the fact that there are now more than 200 investment trusts in England with a capital of more than a half billion pounds sterling.

The development of investment trusts in the

United States is of recent date. As late as 1924 there were only 18 such companies with a capital of about 15 million dollars. In 1925 their number had grown to 48 and by 1928, it had reached nearly 200; the next year there were 389 and on June 1, 1931, there were 648 investment trusts in this country. It has been estimated that between 1924 and 1930 the total financing of these trusts amounted to $2,894,270,000 of which $2,510,214,000 represented stocks and $384,054,000 bonds.

All these American companies are not modeled on the English form. There are many variations in this country of two distinct types. The first of these, the direct or management type, is comparable to the classic English trust. Management trusts, operating like corporations, receive directly from the public the capital derived from the sale of their shares, debentures, or bonds, and usually they invest this capital as they see fit under the guidance of their management.

Directors and executive committees of management trusts usually have wide powers to buy and sell various securities as their option. Their policies differ greatly but generally in their portfolio there is a flexible ratio between stocks and bonds. A certain percentage of the fund set aside for stocks, is usually used to purchase each of the following: public utility, railroads and industrials. Chemicals of course, come under the last heading. In the past, the various large trusts have purchased widely differing percentage amounts of chemical securities. Some have had no chemicals, others have bought chemical securities amounting to as much as 10% of their total stock

Table I

HOLDINGS AS OF END OF 1929 AND 1930

(Number of Shares)

	Air Reduction		*Allied Chemical*		*American Cyanamid*		*Columbian Carbon*		*Commercial Solvents*		*Du Pont*		*Eastman Kodak*	
Investment Trusts	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*
Adams Express Co.	...	3,000	...	1,050	4,000	...	...	...	...	5,000	...	2,000	...	4,500
Atlantic Securities Corporation	1,000	...	525	734	...	...	...	...	...	...	...	1,000	...	...
Capital Administration Co. Ltd.	...	...	...	550	...	...	...	...	...	...	500	1,000	...	...
Chicago Investors Corporation	300	600	...	630	1,000	...	400	800	...	...	...	...	...	...
General American Investors Co. Inc.	3,000	...	...	...	...	...	...	...	5,000	...	...	...	...	...
Incorporated Investors	9,000	9,000	8,200	...	...	...	...	...	...	...	18,000	18,600	...	6,000
Lehman Corp.	3,000	14,000	...	2,100	...	...	...	...	...	...	...	3,000	7,800	3,000
Massachusetts Investors Trust	1,500	2,000	...	...	2,000	...	...	...	4,000	4,000	2,000	2,000	500	2,000
Reliance Int'l Corp.	1,700	...	600	1,000	...	...	...	...	...	...	600	...	1,100	1,100
Spencer Trask Fund Inc.	...	...	5,000	4,000	10,000	10,000	...	...	...	...	...	...	...	...
Tricontinental Corp	2,600	...	1,000	1,700	4,000	...	...	...	7,300	...	6,500	2,700	5,300	2,000
Vick Financial Corp	2,200	2,500	...	...	...	...	...	...	...	...	...	500	...	...

	Mathieson Alkali		*Monsanto*		*Newport*		*Texas Gulf Sulphur*		*Union Carbide*		*U. S. Industrial Alcohol*		*Westvaco*	
	1929	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*	*1929*	*1930*
Adams Express Co.	7,300	17,600	...	...	...	...	4,000	...	1,000	10,000	...	...	...	...
Atlantic Securities Corporation	...	...	...	...	...	...	...	...	2,000	2,000	...	...	...	...
Capital Administration Co., Ltd.	...	...	...	...	...	...	...	...	4,000	5,000	...	...	...	...
Chicago Investors Corporation	...	...	1,630	1,300	...	1,000	1,000	1,000	3,500	1,500	300	...	1,200	...
General American Investors Co. Inc.	...	...	2,030	...	...	...	...	...	8,000	2,000	3,000	...	...	...
Incorporated Investors	...	...	...	...	...	...	...	...	22,700	23,600	...	...	...	...
Lehman Corp.	...	...	...	...	...	...	...	...	9,700	14,700	...	...	...	...
Massachusetts Investors Trust	...	...	...	...	...	...	500	1,500	2,450	3,100	...	...	...	...
Reliance Int'l Corp.	1,000	...	...	...	...	...	1,000	1,000	1,100	1,100	1,000	...	...	...
Spencer Trask Fund Inc.	...	...	...	...	...	...	3,000	3,000	...	2,000	...	...	...	...
Tricontinental Corp.	...	...	...	...	...	...	...	...	18,860	14,000	...	...	...	...
Vick Financial Corp.	...	...	...	...	...	...	2,500	2,000	...	...	...	...	...	...

investment. However, in general, it may be said that chemical holdings have been between 3 and 5%.

As an illustration of this fact, we may take the tabulation given below showing the approximate percentage of various classes of stocks held by two representative investment trusts, the one large and the other of medium size, as of December 31, 1930.

	Lehman Corporation	*Capital Administration Co., Ltd.*
Railroads	4.5%	1.4%
Public Utilities	9.8	10.2
Automotive	0.8	0.2
Banking, Insurance, Finance	9.5	8.1
Chemical	3.7	5.6
Electrical Equipment	0.9	
Food Products	7.9	1.5
Manufacturing, etc.	7.8	2.2
Merchandising	8.9	.4
Metals and Mining	6.6	3.3
Oils	3.2	2.3
Tobacco	1.9	

In connection with the above table, it is interesting to note that as of January 1, 1931, the total value of common stocks listed on the New York Stock Exchange was $41,805,068,433 of which $3,420,610,249, or 8%, represented the value of chemical stocks. It appears from this that so far chemical stocks have had a greater appeal for the general public than they have had for the managers of investment trusts.

Just how the policies of a number of trusts have differed with regard to chemicals is shown in Table No. 1, comprising a comparative tabulation of the chemical holdings of a few large investment trusts at the end of the year 1929 and 1930, and in Table No. 2, which shows the chemical holdings as of June 30, 1931, of those which publish semi-annual lists of their investments. It will be seen that the investments in chemical stocks have been restricted, so far, to a comparatively small number of leading companies.

Even among these there are only three which appear to be very popular: Union Carbide, duPont, and Air Reduction. In 1929 ten of the twelve trusts listed in Table No. 1 had substantial holdings in Union Carbide; in 1930 all but one of the trusts had commitments in this company and the total number of shares held had increased. If we turn to the six trusts given in Table No. 2, we find that all but one of them had Union Carbide stock in 1930 and while most of them reduced their holdings in 1931, one of them increased its commitments. Dupont holdings are the second largest in 1929, while Air Reduction is the next in line. In 1930, their relative positions were reversed so far as the 12 trusts listed in Table No. 1 are concerned and among the six trusts given in Table No. 2, the holdings of Air Reduction while lower than in 1930, are still larger than those of duPont. American Cyanamid the holdings of which almost equaled those of Air Reduction, in 1929, decreased by more than half in 1930 and do not appear at all in Table No. 2. The holdings of Eastman Kodak, the next most popular stock in 1929 were increased in 1930, but nearly all dropped in 1931. Allied Chemical commitments decreased in 1930 and are completely missing in 1931.

Table No. 3, presents as of the end of 1930, the total number of chemical shares held by 149 managements trusts. It is interesting to note the relatively small percentage of shares held by these trusts compared to the total number of shares outstanding. And it is quite evident, that these trusts are at least so far as the chemical industry is concerned, adhering to the policy of not taking any part in the management of the companies whose stock they hold. Nevertheless, due to the increasing importance of the chemical industry in our modern life, it is expected that more and more chemical securities will be found in investment trust portfolios.

Table III

Holdings of 149 Management Trusts as of End of 1930

Company	*No. of Shares Outstanding*	*No. of Shares Held*	*Per Cent Held*
Air Reduction	830,435	59,065	7.1
Allied Chemical	2,286,980	26,143	1.1
American Cyanamid "B"	2,404,176	36,665	1.5
Columbian Carbon	498,505	2,552	0.5
Commercial Solv. Corp.	2,533,187	47,190	1.8
Du Pont	11,065,710	66,287	0.6
Eastman Kodak	2,261,030	24,560	1.1
Freeport Texas Co.	729,844	17,000	2.3
Mathieson Alkali	650,436	37,560	5.8
Newport	521,220	4,350	0.8
Texas Gulf Sulphur	2,540,000	36,100	1.4
Union Carbide	9,000,143	198,797	2.2
U. S. Industrial Alcohol	373,486	26,300	7.0

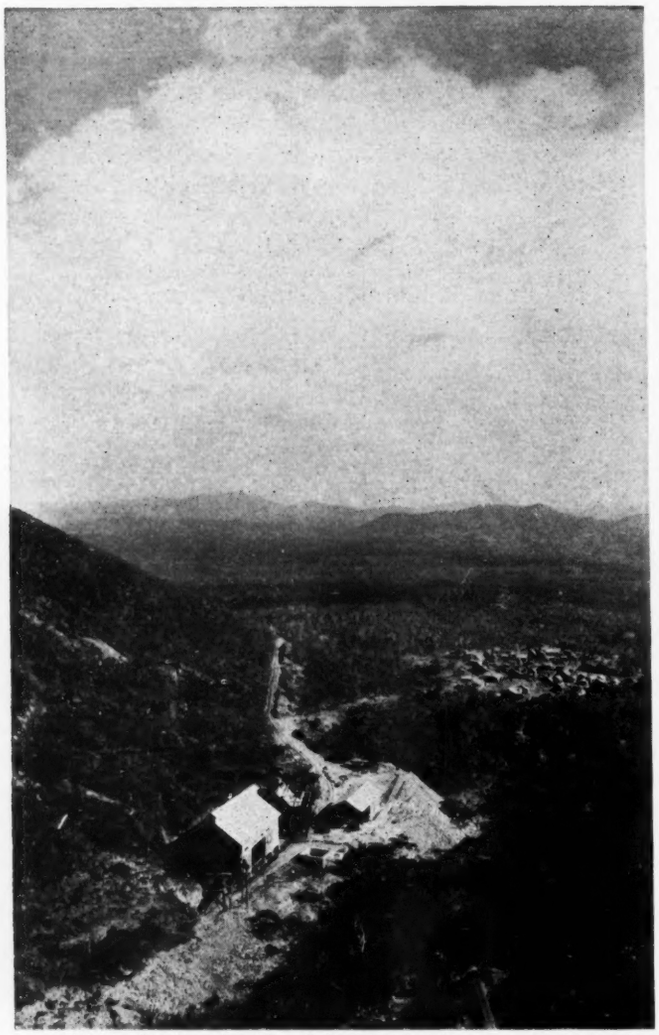
Table II

HOLDINGS AS OF END OF 1930 AND JUNE 30, 1931

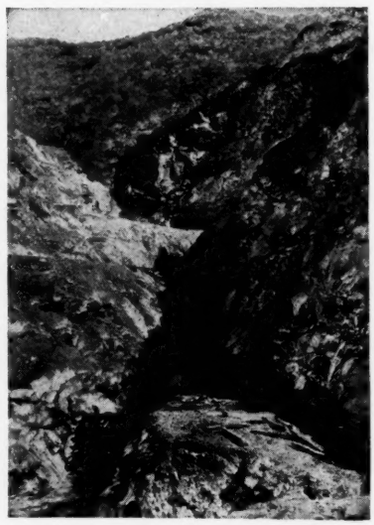
(*Number of Shares*)

	Air Reduction		*Allied Chemical*		*Du Pont*		*Eastman Kodak*		*Texas Gulf Sulphur*		*Union Carbide*	
Investment Trusts	*1930*	*1931*	*1930*	*1931*	*1930*	*1931*	*1930*	*1931*	*1930*	*1931*	*1930*	*1931*
Atlantic Securities Corp.	....	....	734	....	1,000	2,000	....	....	....	....	2,000	2,000
Capital Administration, Ltd.	....	....	550	....	1,000	900	....	....	....	....	5,000	4,700
Incorporated Investors	9,000	10,000	....	....	18,600	18,600	6,200	....	....	....	23,600	24,000
Lehman Corporation	14,000	12,700	2,100	....	3,000	....	3,000	....	....	....	14,700	8,500
TriContinental Corp.	....	4,000	1,700	....	2,700	1,000	2,000	1,000	....	....	14,000	10,000
Vick Financial Corp.	2,500	300	....	....	500	....	....	....	2,000	1,000	....	....

In The Chrome

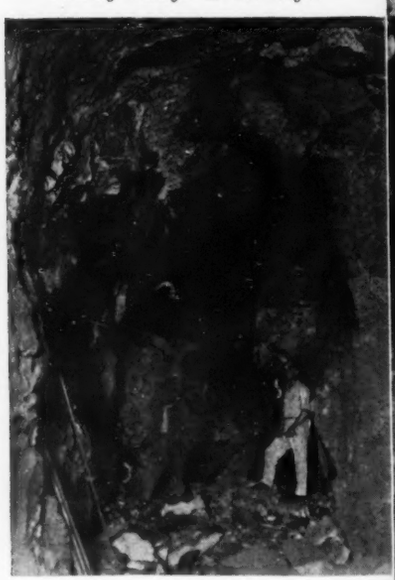


Bichromates are among our most important industrial chemicals. In the tanning of leather, the manufacture of chrome greens and chrome yellow, in brass manufacturing operations, in the treatment of certain oils employed in soap, in the manufacture of chromic acid for chrome plating, as an oxidizing agent in many chemical reactions, sodium and potassium bichromate find large tonnage outlets. From the day in 1884 when Schultz, a dyestuffs salesman, insisted upon the practicability of chrome tanning of leather, producers of chrome chemicals have found it necessary to go out of the territorial confines of this country for a satisfactory source of chrome ore



Above, entrances at various mine levels

New Caledonia, former French penal colony, situated 1,000 miles off the coast of New Zealand, and over 10,000 miles from the Atlantic Seaboard, is famous for both the physical and chemical properties of the chrome ore locked in the mountain fastness. Above, one of the newest and largest mines. Shed houses large Ingersoll-Rand compressors, tramway can be seen in the background, as well as the mining village to the right

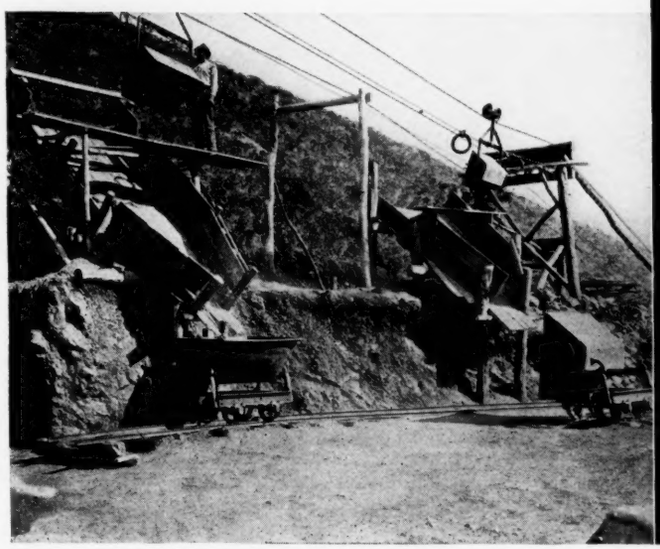


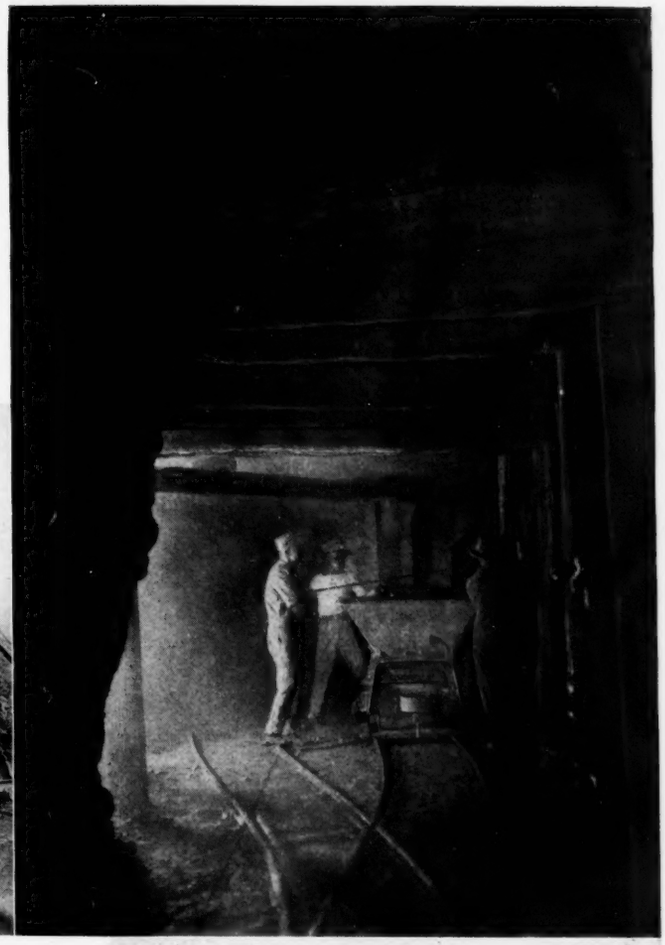
A splendid contrast of the old and the new. Above, the former method of hand drilling and, left, a Javanese laborer efficiently handling an Ingersoll-Rand power drill. Extreme left, a newly opened seam ready for further blasting and shoring

Photographs were taken at the Mutual Chemical Co. of America's mining properties in New Caledonia and are reproduced through the courtesy of that company

Ore Fields

American Mining Methods Revolutionize Operations in New Caledonia





American mining engineers have replaced tedious and highly expensive hand operations with the latest handling equipment. Chrome ore mining in its final stages is carried out in a manner quite similar to domestic anthracite mining operations. Because of the mountainous character of the country and the absence of roads, the ore is conveyed from the interior by means of a series of overhead cables and narrow gauge rail systems. The ore is stored at the seacoast and upon the arrival of an ore steamer is again weighed while in the gondola cars, loaded into barges and lightered to the, ship's side. Dredging operations will eliminate this final handling

The introduction of chrome steel has added further impetus to the growth of chrome ore mining operations. Rhodesia and India, specially the former are now shipping large tonnages, but the physical and chemical properties of New Caledonian ore are of special importance to bichromate producers

Applying hydrocyanic acid "wafers"—the latest method of household fumigation

Cyanide Chemicals In The Last Decade*

Cyanamid Process Cyanide Finds Wide Applications in the Metallurgical, Fumigation, and Organic Synthesis Fields.

By G. H. Buchanan**

ELEVEN years ago, at a meeting of the Canadian Institute of Mining and Metallurgy, Dr. W. S. Landis, described a new process for the manufacture of cyanide. This process involved its production by fusing calcium cyanamide with salt in an electric furnace. Since the time of the introduction of the MacArthur-Forrest process for the extraction of gold and silver from their ores, the attention of industrial chemists the world over had been concentrated upon processes for the manufacture of cyanide, and it is therefore not surprising that this paper, describing a new and cheaper method, aroused great interest.

Briefly reviewing Dr. Landis' paper, he stated that commercial manufacture was begun in 1917, the product at the end of this year having an average cyanide content of 22 per cent NaCN equivalent. During 1918 the batch furnace used in the early work was abandoned in favor of a continuously operating furnace, and by the end of 1918 the process had been improved to permit regular production of a product containing 30 per cent NaCN equivalent. The year 1919 saw the introduction of a number of improvements which greatly increased the average grade of the product, so that by the close of this year a product containing 46 per cent NaCN equivalent was in regular production.

In the eleven years which have elapsed the process of manufacture has been further improved. Important advances have been made in the uses of the product.

Cyanamid Process cyanide physically, is in flake form, the flakes being of irregular size and about 1 mm. thick. The usual color is steel gray but there are occasional flakes which are almost dead black. The flakes are somewhat brittle but resist handling very well.

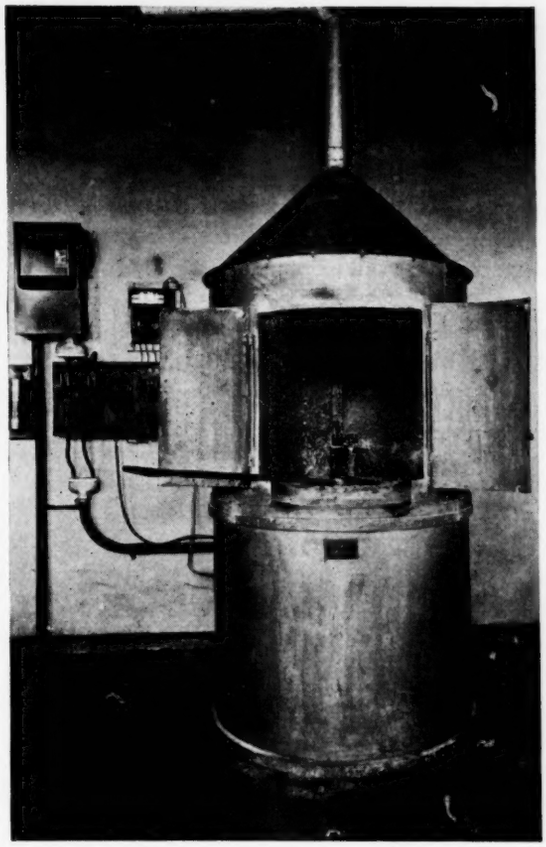
An average analysis of the product is as follows:

CN^- = 25.44 per cent equivalent to 45.03 per cent $(Ca(CN)_2$ or 47.94 per cent NaCN; Cl^-, 19.79; Ca^{++}, 32.13; Na^+, 12.11; CN_2^-, 0.88; SiO_2, 0.87; R_2O_3, 1.95; free carbon, 2.81; CaC_2, 1.90.

The properties of cyanamid process cyanide are different from those of ordinary sodium cyanide and correspond more nearly to the properties attributed to calcium cyanide. The most convincing argument for the occurrence of the cyanide in combination with calcium rather than with sodium is the fact that the product now manufactured contains very much less sodium than the equivalent of the cyanogen. From this it follows that a part, at least, of the cyanogen is attached to calcium. Thus, in the analysis given above, the sodium present is equivalent to only about one-half of the total cyanogen.

In general, the process as conducted today is the same as that described by Dr. Landis, although improvements have been made in the direction of improving efficiencies and decreasing costs. In this paper Dr. Landis said "We anticipate being in position to supply a product containing over 50 per cent equivalent sodium cyanide by the time the demand for the grade arises." This prediction has been amply justified. The present day product is kept close to 50 per cent equivalent sodium cyanide, this having been found the most economical point of operation. Theoretically, perfect conversion of calcium cyanamide, con-

**Chief Technologist, American Cyanamid Co.
*Abstracts from paper presented at the Electrochemical Society meeting Sept. 7.



An electrically heated furnace with a heat resisting alloy pot in use in the research laboratory of the American Cyanamid Co. The alloy pot in this furnace has been in daily use for over eighteen months

taining say 22 per cent nitrogen, the conversion being obtained without admixture of any fluxing ingredient, would give a product containing 77 per cent equivalent sodium cyanide. Actually, of course, a flux is employed, and the grade of the cyanide product produced depends upon three factors: (1) the nitrogen content of the calcium cyanamide used in the process; (2) the percentage of salt used in the fluxing operation and (3) the efficiency of the nitrogen conversion. It is not difficult to make a crude cyanide containing 55 per cent equivalent sodium cyanide or even higher, but the advantages gained by increasing the grade over the usual 50 per cent are slight and do not, for the present, justify themselves, all points of view being considered.

The process of manufacture consists of the fusion of calcium cyanamide and salt in a continuously operating electric furnace, the material being tapped at regular intervals into a sump outside the furnace. As is now well-known, the conversion of calcium cyanamide to calcium cyanide is an equilibrium reaction, represented by the equation

$$CaCN_2 + Carbon \rightleftarrows Ca(CN)_2$$

The success which has attended its manufacture is due to appreciation of this fact. The equilibrium is shifted strongly to the right at high temperatures, so that the molten material leaving the furnace contains practically all of its nitrogen in the cyanide form. By proper cooling of the melt, the equilibrium is "frozen" at the high temperature equilibrium point.

Two important applications of cyanide in the field of hydrometallurgy are to be considered. The first is its well established use for the extraction of gold and silver from their ores. The second is the more recent application as a reagent in the concentration of ores by the flotation process.

The Use of Cyanamid Process Cyanide for the Extraction of Gold and Silver

Cyanamid process cyanide is now used for the extraction of gold and silver in every mining district in the world. It is recognized to give identical precious metal extraction, pound for pound of contained cyanide, with the higher test cyanide products.

A single disadvantage of the black cyanide is that it is necessary to transport approximately two pounds of the product for every pound of contained cyanide. This is not always as bad as it sounds, because of the fact that a considerable proportion of the excess weight in cyanamid process cyanide is lime, which is required in all cyanide operations and which would probably have to be transported anyway. Incidentally, this lime content is a factor of some economic consequence at operations where lime is difficult to obtain.

The flaky form of black cyanide renders it easy to handle. Mechanical feeders have been developed which permit precise control of the rate and amount of the cyanide addition. Usually it is not necessary to predissolve the cyanide and it is added in solid form directly to the mill circuit. However, it is not recommended that solid black cyanide be added to pregnant silver solutions because the small amount of sulfur present, amounting on the average to about 0.4 per cent, may cause precipitation of the silver as sulfide. This precipitated silver would eventually redissolve but it is not good practice to precipitate the silver after it has once been dissolved. For this reason it is common practice in silver operations to dissolve the cyanide in a separate solution tank and to aerate the solution to destroy the sulfides, after which it can be added without danger of precipitation. The precipitation problem does not arise in the case of gold extraction and the cyanide can be fed in solid form into the mill solution at any convenient point.

The practice of cyanide extraction has not changed greatly during the ten years in which black cyanide has been in use. Perhaps the two most important developments, at least the most important from the point of view of the cyanide manufacturer, are the introduction of cyanide regeneration and of the Crowe vacuum system. Both have influenced cyanide consumption to some degree. By reducing consumption per ton of ore they have reduced costs to the individual operator, and the reduction in cyanide consumption thus effected has been compensated by the fact that in some cases it permits the treatment by cyanidation of

ores which would not have been so treated without it, owing to their large cyanide consumption.

The use of cyanide as a reagent in the flotation concentration of ores is just about ten years old. It is now an important consumer of black cyanide although other cyanides are also used for this purpose.

Cyanide is used in flotation as a depressor, that is, it is a substance having the property of rendering non-floatable or difficulty floatable minerals which would otherwise be floatable. Thus it permits the separation by flotation of two or more minerals which would normally be recovered in a single concentrate. Specifically, the depressor is used in the case of complex lead-zinc-iron ores to prevent the floatation of zinc and iron while the lead concentrate is being floated, the zinc being later recovered after activation, the iron remaining depressed. A depressor is also used in the case of copper ores to prevent the flotation of iron minerals during the recovery of the copper, thus permitting production of a higher grade copper concentrate.

The importance of differential floatation as applied to complex lead-zinc ores needs no emphasis in the State of Utah where such ores constitute an important part of the mineral wealth of the State. Although cyanide is not the only reagent used in the differential floatation of such ores, it is unquestionably one of the most important.

U. S. Patents 1,421,585 and 1,427,235, issued in 1922 to Sheridan & Griswold of Butte, Montana, disclosed this new use of cyanide. Representative claims of these two patents are worth repeating, since they show very clearly the nature of the invention. One claim of U. S. Patent 1,421,585 reads:

"A process of concentration by flotation of an ore containing lead sulfide and one or more other metallic sulfides, including iron sulfide, which comprises treating the ore with a cyanide and an alkaline salt and subjecting the thus treated ore to a flotation operation whereby the lead sulfide is in large part recovered in the resulting froth and the flotation of the iron sulfide is in large part inhibited."

Another claim from U. S. Patent 1,427,235 is as follows:

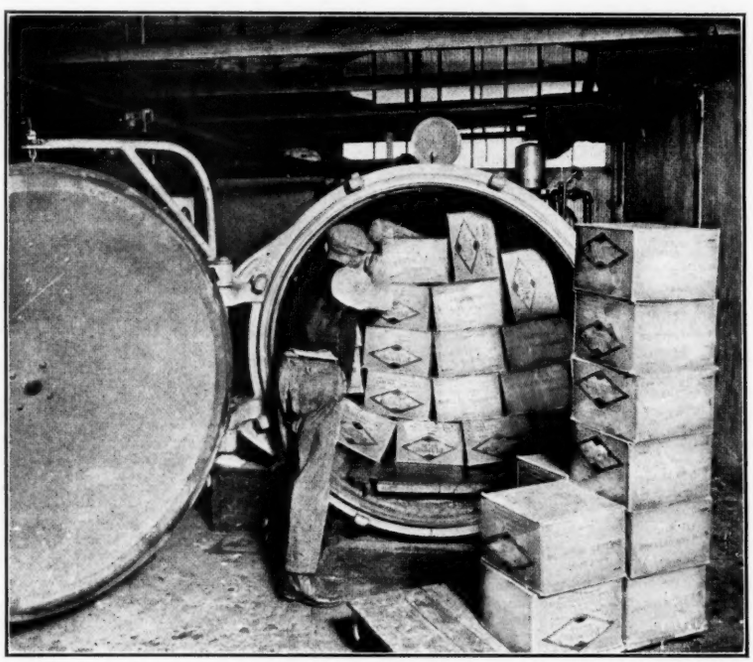
"A process of concentrating by flotation an ore containing sulfides of iron together with one or more metallic sulfides which comprises treating the ore with a cyanide and an alkaline salt and subjecting the so treated ore to a flotation operation in which the flotation of the iron sulfide is in large part inhibited."

Cyanide was first used commercially by the Consolidated Mining and Smelting Company at Trail, B. C., and a few months later at the Timber Butte mill at Butte, Montana. Another early user was the International Smelting Company at Tooele, Utah, only a few miles from Salt Lake City. The first literature reference is in the Canadian Mining Journal for November, 1923, where the operations of the Consolidated Mining and Smelting Company are described.

Different flotation mills employ the cyanide in different ways. Sometimes cyanide alone is relied upon. In cases where it is desired to separate zinc from lead by inhibiting the flotation of zinc, best results are secured by the use of cyanide in conjunction with a zinc salt. The zinc sulfate and the sodium cyanide are usually so proportioned that at least enough zinc sulfate is used to satisfy the requirement for the formation of a normal cyanide of zinc.

When pyrite depression is desired, the cyanide is generally used alone. It is a fact, however, that cyanide is more effective as a pyrite depressor in the presence of iron salts, just as it is more effective for zinc depression in conjunction with zinc salts.

The most commonly occurring lead mineral, galena, is relatively insensitive to depression by cyanide and



Commercial fumigation assumed a new meaning with the introduction of liquid hydrocyanic acid applied from the outside of the structure under treatment. Most of the hazards were eliminated in this way. The outstanding features of vacuum fumigating chambers are the penetration which they insure of any article to be fumigated and the remarkably short time which is required for successful fumigation work. This is the most advanced method of fumigating foodstuffs and other materials. Both incoming and outgoing materials can be fumigated without loss of time or production and at a minimum cost. Vacuum fumigation is particularly applicable to tobacco and tobacco products, candy, nuts, packaged rice, dried fruits, and packaged and bulk cereals of all kinds.

the almost universal practice in zinc-lead differential work takes advantages of this property. The copper minerals differ in their reactivity toward cyanide. When sufficient amounts of cyanide are used, these also can be depressed and advantage is sometimes taken of this fact to accomplish the separation of lead from copper minerals, the copper being depressed while the lead is being floated. The copper minerals are, however, less sensitive to cyanide than the iron minerals and by carefully controlled additions, separation of copper minerals from iron is accomplished.

Applications in the Case Hardening of Steel

Cyanamid process cyanide has played an important part in a recent development in case hardening practice.

The use of potassium and sodium cyanides in molten form for case hardening is well established and the process is an important cyanide consumer. In this process the steel to be treated is immersed for varying lengths of time and at varying temperatures in a molten bath which consists either of the high test alkali cyanide itself or of the latter diluted with varying amounts of sodium chloride and sodium carbonate. The temperature of the operation rarely exceeds 1550° F. (843° C) and the time of treatment varies from a few minutes to one hour. Sodium cyanide baths containing less than 30 per cent NaCN will not case harden appreciably but such mixtures are frequently used for the heat treatment of previously hardened steels where a slight surface decarburization is not important.

The advantages of liquid bath processes of this kind over pack carburizing arise from the uniformity of heating, the ease of control, the flexibility and cleanliness of a molten salt bath. Liquid baths are particularly suited to the treatment of small parts and find wide application in the automotive industry.

Cyanide hardening has, however, certain limitations which have thus far restricted its use to objects to which case depths not to exceed 0.010 in. (0.25mm.) are to be imparted. Sodium cyanide baths are rarely used to produce case depths greater than the above because beyond this point the rate of penetration is slow and uneconomical. There is, moreover, a limit to the carbon concentration which can be obtained with a cyanide bath and when higher concentrations are required recourse must be had to other methods.

A further disadvantage of the ordinary cyanide bath is the fact that its cyanide concentration varies continually. This is due principally to oxidation of the cyanide to carbonate. Although the rate of deterioration of a cyanide bath at operating temperatures is fairly well-known, amounting to about 5 per cent per hour for baths of higher cyanide concentration, it remains true that one is never quite sure of the cyanide content, and consequently of the hardening properties of the bath, at any given moment. At operating temperatures higher than 1550° F. (843°C.), cyanide decomposition is very rapid.

The Aerocase process is a modification of the older method of hardening in a molten cyanide bath, in which the new cyanide made by the cyanamid process is used. Two materials are employed in the process, the bath and the activator. The former is a fused mixture of anhydrous neutral salts; the activating agent is calcium cyanide manufactured in a special form for this purpose.

The method of operation is as follows: The pot is filled with the molten bath mixture which is heated to operating temperature and a small amount of the activating material is added. The amount of activator used varies from ½ to 1 per cent of the weight of the salt mixture contained in the pot. Since the concentration of the activating material in the bath must be maintained during operation to insure production of a uniform case of the desired depth and hardness, additions of the activating agent are made every hour, amounting to ½ to 1 per cent of the weight of the bath. Almost no volatilization of the salts occurs from the bath and consequently the temperatures used may be considerably higher than with ordinary liquid baths. The average cyanide content of the bath, imparted to it by the additions of activator, is from 0.2 to 0.3 per cent calculated as calcium cyanide. This is to be compared with the 30 to 90 per cent sodium cyanide content of ordinary cyanide hardening baths.

Applications in Fumigation

Another important difference between sodium cyanide and calcium cyanide is observed when the substances are exposed to air. When solid sodium cyanide is exposed to air only a slight evolution of hydrocyanic acid occurs. This is principally due to reaction with the carbon dioxide in the air. Although absorption of moisture from the air takes place on the surface of the cyanide, the strong solution of sodium cyanide thus formed is stable and little or no hydrocyanic acid is liberated after the carbon dioxide of the air has been consumed. In other words, hydrolysis of the cyanide and liberation of hydrocyanic acid according to the equation

$$NaCN + H_2O = HCN + NaOH$$

can take place only to a limited extent before it is stopped by the accumulation of alkali in the solution.

The situation is very different when calcium cyanide is exposed to moist air. Not only does the carbon dioxide of the air liberate HCN, but the moisture of the air does so as well and, since the average amount of moisture in the air is greatly in excess of the amount of carbon dioxide present, much higher concentrations of gaseous HCN are obtained from calcium cyanide than from sodium cyanide.

The explanation is that in the reaction

$$Ca(CN)_2 + 2H_2O = 2HCN + Ca(OH)_2$$

calcium hydroxide is quite insoluble, particularly in a strong solution of calcium cyanide; the reaction can

therefore proceed to completion to the right, since it is not stopped by the accumulation of alkalinity in the solution. This property of calcium cyanide of liberating its HCN when exposed to moist air has become the basis of a very considerable application for the crude calcium cyanide produced by the Cyanamid process.

The rate of evolution of hydrocyanic acid depends principally upon the physical state of the calcium cyanide, that is, upon its sub-division and density, both of which are varied to meet the particular needs. Provided the relative humidity of the air to which the material is exposed does not fall below 35 per cent, the rate of evolution is practically independent of the relative humidity. If the relative humidity is below 35 per cent, the evolution of the gas is slowed down.

Calcium cyanide is offered in several forms, depending upon the use to which it is to be put and the method of application which is to be adopted. In some cases the material in a finely powdered form is applied by a blower which discharges a cloud of the dust into the space to be fumigated. For other applications the material in granular form is spread out on the floor of the space to be fumigated or is poured into a convenient opening.

The uses to which calcium cyanide is put may be divided roughly into five groups: first the fumigation of enclosed spaces; second, the destruction of burrowing animals; third, the treatment of subterranean insects and worms; fourth, open air dusting; fifth, as a poisonous barrier. In the time available, it is possible to mention only a few of the high lights of these activities. A literature in many languages has accumulated, particularly in the technical journals relating to economic entomology. A brief mention of some of the special applications may, however, be of interest.

Under the fumigation of enclosed spaces attention is called particularly to the use of the material for the fumigation of greenhouses for the control of plant lice, aphids, mealy bugs, and so on through the list of twenty-three pests or groups of pests which the greenhouse man is called upon to combat. The method of application usually consists of pouring a small amount of the granular material upon the floor of the greenhouse. The concentration of hydrocyanic acid required for the control of greenhouse pests is very small and no special equipment or apparatus is required.

One of the largest uses of calcium cyanide is for the control of burrowing animals, as for example ground squirrels, praire dogs, rabbits, rats and the like. The methods of application depend upon the life habits of the pest. One method consists in pouring the material down the entrance of the burrow, the burrow being closed after the treatment, or, in some cases, even left open. Another method consists in introducing the calcium cyanide as a finely divided dust into the mouth of the burrow. This is the usual practice for the control of animals which have an extensive system of burrows and many entrances, notably rats and rabbits. The extent to which this material is used for the control of burrowing animals would surprise anyone who has not lived in a country where burrowing animals are an economic problem. In Australia in particular, where the rabbit is an ever present pest, control of the animal by use of calcium cyanide is established practice. Under this same heading may also be considered the control of ants, termites and similar burrowing insects.

Calcium cyanide is used to a limited extent for the fumigation of soil for the control of such pests as wire worms. The difficulties involved in soil fumigation are serious and it cannot be claimed that the last word has been said on this difficult problem.

Large amounts of calcium cyanide are used for open air dusting, notably for the control of the grape leaf hopper in California. Here the material is blown against the vine in the form of finely divided dust through a hand or power blower, the evolution of HCN from the material in this form being almost instantaneous.

Calcium cyanide has also been applied with some degree of success for the control of chinch bugs by employing it as a barrier material.

Application to the Manufacture of Liquid Hydrocyanic Acid

The liquid hydrocyanic acid industry is one of the important chemical industries of the State of California and is a large user of cyanamid process cyanide.

The process of manufacture and the methods of use can be mentioned only briefly. The liquid hydrocyanic acid is produced by treating the cyanide with sulfuric acid and condensing the hydrocyanic acid thus liberated. The "gas" is then redistilled to free it from water. The liquid hydrocyanic acid of commerce contains from 96 to 98 per cent actual HCN. The liquid is transported in trucks throughout the citrus belt, packed in tinned-iron cans each holding approximately eighty pounds of the liquid.

Liquid HCN produced from cyanamid process cyanide is also sold under the trade name Zyklon-Discoids, packed in one pound and in 40 oz. tinned-iron cans in which the liquid is absorbed in disks of a very absorbent paper-pulp composition.

Besides its use in citrus fumigation, liquid hydrocyanic acid is also used for fumigating ships, warehouses and the like. Its effectiveness for the control of insects and other pests is too well-known to require repetition.

Leaving the use of hydrocyanic acid as a fumigant, we turn to its use in organic synthesis. Hydrocyanic acid is an exceedingly reactive substance and is capable of combination with a large number of organic substances. By no means all of these reactions have found commercial application, but some of them have, and doubtless more will develop in future. In general,

organic chemists have avoided the use of hydrocyanic acid on account of its reputation for toxicity. Admitting that hydrocyanic acid must be handled with caution, and the fact is not for a moment denied, it is nevertheless true that, to those experienced in

Showing the simplicity of fumigating with Discoids in which hydrocyanic acid is absorbed in a paper-pulp composition

handling it, HCN is no more dangerous than many other substances which the organic chemist is called upon to use.

One commercial application of some importance is in the manufacture of hydroxy acids and their esters. When HCN is reacted with acetaldehyde, the nitrile of lactic acid is formed. The reaction is

$$CH_3CHO+HCN=CH_3(CHOH)CN$$

Lactonitrile may be hydrolyzed by acids in aqueous solution to lactic acid and ammonium chloride, and in alcoholic solution to ethyl lactate and ammonium chloride. If acetone is substituted for the acetaldehyde, the nitrile of alpha hydroxy-isobutyric acid is formed, which also may be hydrolyzed to the acid or to the corresponding ester. Both ethyl lactate and the hydroxy-butyrate are articles of commerce.

Hydrocyanic acid chlorinates very readily to yield cyanogen chloride and hydrochloric acid. Cyanogen chloride finds a limited application in fumigation. Not only is it toxic in itself, but it is also strongly lachrymatory and is used to some extent in admixture with hydrocyanic acid as a warning gas. Cyanogen chloride thus produced is utilized in organic synthesis for the production of the substituted guanidines, diphenyl guanidine and diorthotolylguanidine. Although the popularity of these well-known rubber accelerators has somewhat decreased, they are still used in large amounts and the cyanogen chloride synthesis has largely displaced the older methods of production. The reactions are exceedingly simple. Cyanogen chloride reacts directly with two molecules of aniline to form diphenyl guanidine hydrochloride according to the equation

$$2C_6H_5NH_2+CNCl=(C_6H_5NH)_2CNH\,.\,HCl$$

The reaction of hydrocyanic acid with aldehydes and ketones to produce nitriles of hydroxy acids, and the reaction of cyanogen chloride with aromatic amines to produce substituted guanidines are two of the most important commercial applications of hydrocyanic acid in organic synthesis, but many other reactions are possible and doubtless some will assume economic importance. As a convenient source of hydrocyanic acid, cyanamid process cyanide is an important potential raw material of the organic chemical industry.

Application to the Manufacture of Ferrocyanides

It can be justly said that the development of cyanamid process cyanide turned the ferrocyanide industry upside down. When the MacArthur-Forrest process for the extraction of gold and silver from their ores was first introduced, the cyanide which it consumed was prepared from potassium or sodium ferrocyanide. The conversion of ferro-cyanide into cyanide became the subject of intensive study and the technical and patent literature is crowded with references to such work. For a decade at least, the efforts of technologists the world over were aimed at improvements in this conversion. The ferro-cyanides used as raw materials were derived exclusively from the purification of illuminating gas.

With the introduction of the Castner process for the production of sodium cyanide from metallic sodium, carbon and ammonia, it became less profitable to produce cyanide from ferrocyanide, although the process continued to be operated in a small way for some time. However, the reversal of the process, that is the utilization of cyanide as a raw material for the production of ferrocyanide was not profitable and for a good many years the raw materials of the two products were different, the cyanide being produced from sodium and ammonia by the Castner process, and the ferrocyanide from gas works by-products.

The relative position of these two cyanogen products was reversed by the introduction of cyanamid process cyanide. This could be profitably converted to ferrocyanide and today the largest manufacturer of ferrocyanides in the world employs this process exclusively.

Cyanamid process cyanide is peculiarly suited to this transformation. When it is added to a solution of ferrous sulfate, the conversion to ferrocyanide is complete, the excess lime of the cyanide supplying the alkalinity necessary for the reaction. Crystallization of the ferrocyanide from the solutions so obtained is easy. Sulfates are automatically eliminated by the calcium, an important advantage since the separation of sulfates and ferrocyanide by crystallization is troublesome. Part of the sodium required for the product, when sodium ferrocyanide is being made, is supplied by the sodium chloride contained in the cyanide, and the deficiency, if any, is supplied by adding salt or soda ash as desired. The ferrocyanide thus obtained is particularly pure because of the self-purifying character of the solutions from which it is crystallized.

Synthetic Acetic Acid

Recent Patents Point to the Possibility of Using Several Raw Materials Other Than Acetylene

By Dr. Charles E. Mullin*
and
Dr. Howard L. Hunter

ALTHOUGH most of the synthetic acetic acid now on the market is made from acetylene, the recent patents indicate that in the near future other raw materials will be extensively used. Apparently all of the acetylene which is manufactured today is prepared from calcium carbide. Calcium carbide can be made at a reasonable cost only where large quantities of very cheap electric power are available. This is a very limiting factor, as the source of cheap power may be far from the acetic acid market and transportation costs are an important consideration. Therefore, any synthetic acetic acid process in which all of the basic materials can be conveniently prepared without regard to cheap electric power or other locally limiting factor, has a decided advantage over the acetylene processes.

Aside from the acetylene processes discussed in the previous papers, patents have been granted for the manufacture of synthetic acetic acid by the following reactions:

1. The pyrogenic decomposition of ethyl acetate.
2. The reaction of formaldehyde with carbon monoxide.
3. The conversion of methyl formate into its isomer.
4. The reaction of methyl ether with carbon monoxide.
5. The reaction of methane with the oxides of carbon.
6. The direct combination of hydrogen with carbon monoxide.
7. The oxidation of ethylene.
8. The reaction of methyl alcohol with carbon monoxide.
9. The reaction of methyl alcohol with alkali formates.
10. The catalytic oxidation of ethyl alcohol.

With the exception of ethylene, all materials mentioned in the above processes have been synthesized from carbon monoxide and hydrogen. Therefore, it seems reasonable to assume that the processes employing the more simple chemicals will be cheaper to use than those using the more complex compounds, except where an inexpensive source of the latter, other than by synthesis, is available.

Before considering in detail any of the synthetic reactions it appears advisable to point out the interrelation which exists between the materials involved in the elementary processes. The reduction of carbon monoxide occurs in the following steps.[4]

$$CO+H_2 \rightarrow HCHO$$
$$HCHO+H_2 \rightarrow CH_3OH$$
$$CH_3OH+H_2 \rightarrow CH_4+H_2O$$

When these reactions are conducted at atmospheric pressure, the reduction readily goes to completion, with the formation of methane and water. No appreciable yields of the intermediate compounds can be isolated under these conditions. Le Chatelier's law states that any system which is subjected to forces tending to alter its state, will itself change in such a way as to neutralize the effect of the force. Thus, we see that an increase of pressure will force the reactions towards the right, which is in the direction of the smaller number of molecules. Taking this factor into consideration, and using the proper catalyst, a high percentage conversion of carbon monoxide and hydrogen into methyl alcohol has been obtained. This reaction is responsible for the synthetic methanol that has flooded the market in the last couple of years, and has proved so disastrous to the manufacturers of natural methanol by wood distillation processes, causing methanol to decrease about 50 per cent in price during the past three years.

All conditions of this reaction have been thoroughly investigated by Frolich and his co-workers, [5], [6], [7], [8], [11] and [12] and the best temperature and pressure found to be 300 to 350° C. and 200 atmospheres, respectively.

Although an examination of this equation indicates that formaldehyde should be easier to prepare than methanol, and consequently should be an economical material to use for the preparation of acetic acid, Frolich[16] and others have shown that "in spite of the claims of the patent literature, it has evidently not been possible thus far to halt the reduction of carbon monoxide at this point. It would seem that the solution of this problem lies in the development of suitable catalysts."

*Dr. Mullin and Dr. Hunter continue their review of synthetic acetic acid patents. Dr. Mullin is professor of chemistry, Clemson College, Dr. Hunter is assistant professor.

Apparently, then, aside from the processes involving acetylene, the reactions which offer the greatest possibility for the economical synthesis of acetic acid are those in which ethyl alcohol, methanol, ethylene, or carbon monoxide and hydrogen are the primary materials. The following is a discussion of the various processes, in the order as outlined above.

Pyrogenic Decomposition of Ethyl Acetate

At the present time, ethyl acetate is produced commerically by the reaction of ethyl alcohol and acetic acid. However, the Holzverkohlungs Industrie A.-G., has patented a process[a] for the preparation of concentrated acetic acid by the pyrogenic decomposition of ethyl acetate. It is stated that this decomposition produces a combined yield of 98 per cent of acetic acid and ethylene. It is difficult to see how this reaction will be of value from the standpoint of large scale acetic acid manufacture, because as previously stated, acetic acid is one of the raw materials, and no large commerical process produces ethyl acetate as a useless by-product.

British Celanese Limited has patented a process[b] for the reaction of carbon monoxide and formaldehyde vapor at elevated temperatures and pressures, resulting in the formation of acetic acid. However, as previously explained, formaldehyde at the present time can only be satisfactorily prepared on a large scale by the reduction of methanol. As a result, the market price of formaldehyde is practically the same as that of acetic acid, so for the present this chemical will not play an important role in acetic acid synthesis.

Conversion of Methyl Formate

If methyl alcohol and formic acid are allowed to react, methyl formate and water are formed. Dreyfus has devised a process[c] for converting this compound into its isomer, acetic acid, by heating under pressure in the presence of a catalyst. In this case the formic acid used costs approximately the same as the final product, acetic acid. For this reason the process is hardly economical at present.

Brown and Galloway[(4)] have recorded the formation of methyl ether from methanol, and according to Frolich and Cryder[(11)], this probably represents an intermediate step in the production of ethyl alcohol, as shown by the following equations:

$$2CH_3OH \rightarrow (CH_3)_2O + H_2O$$
$$(CH_3)_2O \rightarrow C_2H_5OH$$

However, a practical method has not yet been developed for stopping this two-stage reaction at the end of the first step, and methyl ether is not a particularly cheap chemical, nor at present available in large quantities. This is probably due largely to the fact that methyl ether is a gas with a boiling point of -24.8° C., with the attendant high costs of storage and transportation.

Dreyfus[d] has patented a process for the preparation of methyl acetate and acetic acid by the reaction of dimethyl ether with carbon monoxide in the presence of sodium methylate or ethylate, or an alkali formate. The feature of this process which makes it a commercial possibility, is the fact that it may be combined with the production of dimethyl ether by passing carbon monoxide through a heated mixture of methanol and sulfuric acid. The I. G. Farbenindustrie has patented a process[e] consisting of the catalytic pressure reaction of carbon monoxide with methyl ether. Aluminum and boron halides are suggested as the catalysts.

Acetic Acid from Methane

As has been previously mentioned, complete reduction of carbon monoxide with hydrogen is very easily carried out with the formation of methane, but there is at present an enormous supply of cheap methane available without the necessity for synthesizing it. Since methane is one of the chief constituents of the enormous quantities of natural gas which is piped to all of the large commercial centers, it may be recovered from this source at low cost. It also results from the destructive distillation of coal and other organic materials. It may be of interest to note in this connection that because of this very cheap supply, a great deal of research is being conducted on the conversion of methane into acetylene, to compete with the product from calcium carbide, and it has been stated[(17)] that in Germany the I. G. Farbenindustrie and some of the coal companies have successfully developed such a process.

The Dreyfus interests control a process[f] for converting methane into acetic acid directly. This process consists of bringing a mixture of methane and either carbon monoxide, carbon dioxide, or both, into contact with a heated catalyst, under pressure. Either a hydrogenation catalyst, such as iron, nickel, platinum, etc., or a metallic carbonate which will dissociate, liberating carbon dioxide at the temperature employed, may be used.

Synthesis from Carbon Monoxide and Hydrogen

The direct one-step synthesis of acetic acid from carbon monoxide and hydrogen would undoubtedly be an ideal process. Although this synthesis has been patented, as far as can be determined, it is not commercially practicable in its present form. The difficulty lies in avoiding a very complex mixture of reaction products. Fischer[(3)] used iron-alkali catalysts under pressure and obtained a complex mixture of organic compounds from hydrogen and carbon monoxide. Because of the difficulty of controlling the reaction products, the process has no practical im-

[a] British Patent No. 274,076 and French Patent No. 636,781.
[b] British Patent No. 334,207.
[c] British Patent No. 259,641 and United States Patent No. 1,697,109.
[d] British Patent No. 319,030.
[e] British Patent No. 310,438.

portance at present. It is possible, however, that with time, the optimum combination of catalyst, pressure, and temperature, for the production of acetic acid, will be found, so that comparatively pure acetic acid may be prepared in a single step.

Dreyfus[g] has patented a process in which equimolar mixtures of hydrogen and carbon monoxide are heated at a high pressure in the presence of substances such as metallic oxides, which combine with the acetic acid formed. Metallic oxides are selected, the acetates of which metals decompose at a high temperature, liberating the acid and regenerating the oxide. The I. G. Farbenindustrie[h] has patented a process in which carbon monoxide and hydrogen react in the presence of a catalyst, preferably consisting of a mixture of an element of the first subgroup of the periodic table and an element of the iron family, together with less than 5 per cent of a metal forming a difficulty reducible oxide. The Societe Francaise Catalyse Generalisee[i] specifies the use of nickel, chromium, cobalt, or manganese as catalysts for the reaction of carbon monoxide and hydrogen, with the restriction that if the metals are used in the elemental state, they must be in the form of alloys.

The Oxidation of Ethylene

The use of ethylene gas has greatly expanded during the past few years, probably due to its production in large quantities at a low cost by the cracking of petroleum. It has also been found[(14)] that the gaseous paraffins of low molecular weight, such as ethylene, present in natural gas, may be polymerized to give such compounds as naphthalene, anthracene, and their derivatives. These new uses mean that larger supplies of the pure gas are going to be prepared, and this will result in cheapening the costs of production. In this event, the preparation of acetic acid from ethylene by oxidation may ultimately be carried out on a commercial scale, although at present it is only in the experimental stage.

The method patented by Behrens[j] for the preparation of acetic acid from ethylene consists of heating it with carbon dioxide at a fairly high temperature, and then oxidizing the aldehyde. The process of the Union Carbide Company[k] consists of passing the ethylene into a solution of a mercury salt and then using anodic oxidation to convert it into acetaldehyde, which is removed from the solution by continuous distillation. Acetic acid may be produced by further oxidation on the same solution, without separation of the aldehyde; or the aldehyde may be oxidized, after separation, by any of the several methods in general use.

At the present time, the two chemicals which are most liable in the near future to compete with carbide and acetylene as the basic material for the manufacture of synthetic acid, are methanol and ethyl alcohol. Ethyl alcohol is now manufactured very cheaply from waste organic materials, such as molasses, etc., and synthetic methanol is selling for less than 40 cents per gallon, with a prospect of lower prices in the future. Frolich[(16)] writes that "on the basis of water gas at 25 cents per thousand cubic feet, the cost of production (of methanol) should not exceed 20 cents per gallon." The elimination of methanol on January 1, 1931, as a denaturant for ethyl alcohol will undoubtedly throw considerable methanol from wood distillation on the market. This may cause a further decrease in price of the natural product.

One process patented by British Celanese for the synthesis of acetic acid from methanol consists of heating equimolar proportions of methanol and carbon monoxide with a suitable catalyst, under atmospheric[l] or higher pressures[m]. The catalysts used are of the type that form acetates with the acetic acid, and these acetates decompose at a temperature slightly above that of the synthesis, to give acetic acid. This process is continuous and the catalyst is automatically regenerated. A later process patented by the same company[n] provides for the reaction of methanol and carbon monoxide at elevated temperature and pressure, but the catalyst in this case consists of an inorganic acid or an organic acid containing an inorganic acid group, such as sulfonic acid. Suitable inorganic acids of this type are phosphoric or boric acids, etc. These catalysts do not form acetates. A later modification of this method[o] consists of increasing the activity of the catalyst by adding metallic copper or a copper compound.

The reactions utilized by the I. G. are very similar to those in the later process of British Celanese, the chief difference lying in the choice of catalyst. The patent[p] of the former company specifies that the best catalyst is one which does not sinter or melt at the reaction temperature, and which contains a difficulty reducible metallic oxide. Metallic halides are claimed to act as activators[q] for the reaction and, if the effective area of the catalyst is increased, the reaction is accelerated.

If methanol and molten sodium formate are allowed to react under a pressure of hydrogen, acetic acid is formed[r]. The same patent claims that the gases tapped from a methanol synthesis plant can be converted into alkali acetates by heating under pressure at fairly low temperatures in the presence of caustic alkali or alkali carbonates.

The Oxidation of Ethyl Alcohol

The oxidation of ethyl alcohol to acetic acid[(15)] is a natural phenomenon, and probably almost as old as alcoholic fermentation itself. Until the recent com-

[f] British Patent No. 226,248 and United States Patent No. 1,704,965.
[g] British Patent No. 262,832.
[h] British Patent No. 317,808.
[i] French Patent No. 681,958.
[j] German Patent No. 275,049.
[k] United States Patents No. 1,315,543 and No. 1,315,546.
[l] British Patent No. 268,845.
[m] British Patent No. 264,558 and United States Patent No. 1,743,659.

mercial synthesis of methanol, ethyl alcohol was always the cheaper of the two alcohols. Quite recently it has been announced that synthetic ethyl alcohol is also upon the market. For this reason it is not surprising that the production of acetic acid by the oxidation of ethyl alcohol has received considerable attention by various investigators. Probably the earliest successful patented process along this line was that of Behrens in 1908[s]. This process consists of oxidizing the alcohol to acetaldehyde with air, by means of a platinum catalyst. The aldehyde is then separated by fractional distillation and, after adding dilute sulfuric acid to increase the conductivity of the solution, the aldehyde is oxidized electrolytically to acetic acid. In a modification of this process[t], the alcohol is oxidized to aldehyde by reaction with zinc oxide, or any other suitable oxide. The oxidation of the aldehyde is then effected by the action of oxygen under pressure, in the presence of a small amount of water containing a dissolved catalyst[u]. Ultra-violet light is also said to catalyze the reaction.

In the method devised by Jacob[v], alcohol is oxidized in the presence of porous lead and caustic soda, in an electrolytic cell, with the formation of sodium acetate. This method can also be used for the oxidation of the alcohol in fermentation liquors before distillation[w].

Orloff[(1)] claims yields of acetaldehyde as high as 66 per cent by the oxidation of ethyl alcohol in the vapor phase, in the presence of metallic catalysts. The work of Simington and Adkins[(10)] shows even higher yields. The latter scientists have made a very exhaustive study of the various catalysts used for the air oxidation of ethyl alcohol to acetaldehyde, and a summary of their results is given in Table 1. They believe that the physical form of the alloy has no appreciable effect on the conversion.

Table I

Percentage Conversion of Ethyl Alcohol to Acetic Acid by Various Catalysts

Catalyst	*Per Cent Conversion*
Copper gauze	37.4
Silver gauze	43.7
90% Copper, 10% Zinc Alloy	51.6
80% Copper, 20% Zinc Alloy	31.0
50% Copper, 33% Zinc Alloy	33.0
97.5% Copper, 2.5% Bismuth Alloy	5.1
50% Manganese, 50% Copper Alloy	33.6
50% Copper Oxide, 50% Vanadium Oxide	29.7
50% Copper Oxide, 50% Molybdenum Oxide	13.7
50% Copper Oxide, 50% Tungsten Oxide	23.9
50% Copper Oxide, 50% Tungsten and Uranium Oxides	21.9
1% Nickel, 99% Copper Alloy	43.7

Mailhe and De Godon[(2)] find that when the vapors of ethyl alcohol are passed over finely divided copper at 260 to 270°C. a good yield of acetic acid is obtained. Some of the alcohol is simultaneously oxidized to acetaldehyde. The best yield of acid was 20 per cent on the weight of alcohol employed. The activity of the catalyst gradually decreases with use and is finally effective to only the aldehyde stage. They did not obtain a practical yield of acetic acid with finely divided silver. This conclusion is at variance with the process of Goldschmidt[x], who uses silver as the catalyst for the oxidation of ethyl alcohol vapor by means of air or oxygen. Reduced copper is also used as the catalyst in the method of Hale and Haldeman,[(y)] but they utilize copper oxide for the second stage conversion of the aldehyde to acid. Metallic vanadates have been recommended by Maxted and Coke[(z)] as catalysts for the oxidation of ethyl alcohol. Karpov[(9)] advocates the use of ferric oxide, manganese sesquioxide, cupric oxide, or chromic oxide for the oxidation of ethyl alcohol to acetaldehyde.

King, Swann, and Keyes[(13)] carried out a very extensive investigation on the electrolytic oxidation of various organic chemicals, including ethyl alcohol. It is well-known that certain substances, such as cerium sulfate, which are capable of changing valence, will act as oxygen carriers in electrolytic oxidation processes. In their maximum valence they oxidize the organic compound and are themselves reduced. They are then re-oxidized by anodic oxygen. For this reason, the ions with the highest oxidation potentials should be the best for the oxidation of acetaldehyde to acetic acid. Of the common metallic ions, the order of oxidation potentials, starting with the highest, is cobalt, manganese, cerium, iron, and chromium. On this basis, the above-mentioned investigators determined the efficiency of salts of these metals as catalysts.

They passed air at 50 to 53° C. into a flask containing 96 per cent by volume, of ethyl alcohol, at the rate of 80 liters per hour. The alcohol-air mixture was then passed into a tube filled with activated copper gauze, and heated to 310°C. A 40 to 50 per cent conversion of alcohol to acetaldehyde was obtained. The aldehyde was then oxidized by oxygen, in the presence of various catalysts, primarily selected with reference to their oxidation potentials. Table II gives the results obtained. With air as the oxidizing agent, the yields were slightly lower than when oxygen was used.

Not all of the processes for the conversion of acetaldehyde to acetic acid have been considered in the present paper, for the reason that most of the acetaldehyde used for this purpose at present is made from acetylene. These processes were discussed in the previous paper dealing with the manufacture of the

[n]British Patent No. 283,989, French Patent No. 637,763, and French Patent No. 669,370.
[o]British Patent No. 317,867.
[p]British Patent No. 320,457.
[q]British Patent No. 323,475.
[r]British Patent 271,589, United States Patent No. 1,679,994, and Canadian Patent No. 273,715.
[s]German Patent No. 223,208.
[t]German Patent No. 229,854 and British Patent No. 28,839 of 1910.
[u]German Patent No. 287,360.
[v]French Patent No. 383,595, and British Patent No. 726 of 1908.
[w]Addition to French Patent No. 383,595.
[x]British Patent No. 290,523 and United States Patent No. 1,666,447.

acid from acetylene. In the present paper, only those processes are discussed in which the authors believe the acetaldehyde to come from alcohol, and not acetylene.

Table II

Percentage Conversion of Acetaldehyde into Acetic Acid by Various Catalysts

Catalyst	*Per Cent Conversion to Acetic Acid*
Cobalt acetate	98
Nickel acetate	97
Manganese acetate	97.5–96
Vanadium acetate (brown)	97 –96
Cerium acetate	97.5–96
Vanadium acetate (green)	96 –95
Iron acetate and Chromium acetate	95 –94
Glacial acetic acid	95

At the present time, the manufacture of synthetic acetic acid is simply a matter of price and demand. Just as long as the price of the distillation acid remains below a certain point, tht profitable production of synthetic acetic acid is not possible. This price is largely a matter of demand, and the demand for acetic acid has been increasing very rapidly for some years. The fact that there is, under normal conditions, very little margin between the selling price of the distillation acetic acid and the cost of manufacturing the synthetic product, is indicated by the fact that several of the largest consumers of pure acetic acid now manufacture the synthetic acid to meet their needs. It is possible that the high purity of the synthetic acid may be another factor in favor of this local synthetic acid production.

Future of Wood Distillation

The wood distillation industry is an old one. It has made many changes within recent years and is putting up a hard fight to survive. It is quite probable that, due to the demand for wood charcoal, wood tar chemicals, etc., and the ever-present supply of wood refuse, that wood distillation acid will never be entirely supplanted by the synthetic acid.

The patents covering the manufacture of synthetic acetic acid from sources other than acetylene will be reviewed in the next paper, the last of this series upon synthetic acetic acid. This will appear in an early issue.

[y]French Patent No. 650,771 and British Patent No. 287,064.

[z]British Patent No. 238,033.

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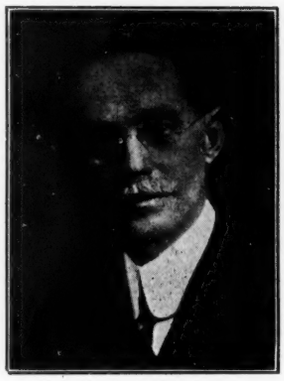
Association News

Fifth annual open meeting of the metallurgical advisory board to the Carnegie Institute of Technology and the U. S. Bureau of Mines will be held on Friday, October 16, on the Carnegie Tech campus. Progress made on research problems undertaken jointly by Carnegie and the Bureau of Mines will be discussed during the morning and afternoon sessions by investigators from the two laboratories.



Dr. H. L. Herty Speaks at Metallurgical Meeting

Mr. Charles F. Abbott, executive director of the American Institute of Steel Construction, Inc., will be the principal speaker at the evening session which will follow an informal dinner at the Hotel Schenley. Mr. Abbott's subject will be "Market Research in the Steel Industry". Dr. Thomas S. Baker, president of the Carnegie and organizer of the advisory board, will preside at the evening session.

The physical chemistry of steel making will be reported on and discussed at the afternoon session. The three outstanding contributions from this work are the development of a new manganese-silicon deoxidizer, which has been shown to be much superior to ferro-manganese ferro-silicon in combination in producing clean steel at a low cost; the development of a method for quantitatively determining non-metallic inclusions in plain-carbon steels; and the determination of the factors which affect the oxidation of steel in the open-hearth furnace. These reports will be made by Dr. Herty and members of the Bureau of Mines staff. The several reports will be interspersed with discussions by metallurgists from the industry.

The laboratories of the Bureau of Mines and of the Carnegie Institute will be open for inspection on Saturday morning. Members of the staffs will be present for informal discussions on work being done.

Alvarez Holds Championship

Al Alvarez Grasselli again won the golf championship of the chemical industry at the annual tournament of the Salesmen's Association held at Briarcliff Lodge, Tuesday, September 15th. His score was 85. Second low gross prize went to C. S. Benjamin, General, with a 90, Robert Breuer, Atlas Refining, took third prize with a 93, and Vic Williams, N. Y. Monsanto manager scored a 97 for fourth prize.

In the guests' low net, Rupert Lowe Bakelite, scored a net 76 for first prize. S. L. Urban, E. R. Squibb buyer, also had a 76 for second prize. D. S. Barnes took third with a net 79 and John Powell, John Powell & Co., won fourth prize with a net 86. R. J. Grant, Noil Chemical and Harry Stebbins, Merck, had the low net for members with 75; Grant taking first prize because of his lower handicap. S. C. Moody, Calco and William H. Adkins, Givaudan-Delawanna, tied at net 79, with third prize going to Moody on the handicap basis.

In the kickers' competition, Grant A. Dorland, MacNair Dorland Co. had a net 73, which was the drawn number, and won first prize. B. J. Gogarty, American Solvents, took second with a 75, W. I. Galliher, Columbia Alkali, won third and Ralph E. Dorland, Dow, took fourth.

Between 40 and 50 members and guests enjoyed the day at Briarcliff, which was brought to a close with a dinner and entertainment at the Casino. This tournament closed the summer season of the Salesmen's Association; four golf tournaments in all having been scheduled. There will be no other meetings until Christmas week when the Christmas party will take place. The date and details will be announced later on.

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NATURALLY enough, the plant manager and the sales manager have difficulty in seeing eye for eye when viewing the pressing problems of today.

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TO KEEP the plant running at just as close to capacity as possible is the operating man's ideal. Any shut-down plays havoc with his cherished cost sheets. Even a slight curtailment of production therefore, is to him only a last resort, while it seems the first, most natural expediency to the salesman. To the one a growing stock on hand is a potential asset, provided only it has been produced at sufficiently low cost: to the other any surplus of this sort is an actual liability to be avoided at any cost.

TO RECONCILE these fundamentally different conceptions of chemical business is often one of the most delicate tasks of management. Understanding and cooperation can only spring from as full a knowledge as possible by both of the very different problems of each of these departments. For the plant manager to propose working up some by-producing or launching out in new products for which there is no market is every bit as unreasonable as it is for the sales manager to demand that production schedules be cut down to what he figures is a perfectly safe sales quota. There must be a give-and-take in such times as these and a toleration that sympathetically comprehends the common purpose in the different functions and distinct responsibilities. To come to loggerheads over these balances of production and sales is only making a bad matter worse at the very season of this difficult year when cooperation is most essential.

POPULAR FALLACIES OF INDUSTRY

WITH a serious deficit staring them in the face executives look frantically for the underlying cause. And—hoodwinked by a popular fallacy—many blame "the times."

★ ★ ★

Asked what they've done to meet the situation they reply, "We've cut corners . . . made savings with such and such equipment, simplified certain processes, and reduced our overhead in all these departments."

When such measures fail to turn red figures into black, manufacturers might as well face the facts: *Perhaps their plant is at fault.* Multi-story buildings, long obsolete, or floor space blocked by columns that cause backtracking and prohibit straight-line production—or scattered, inefficient one-story units—all breed "White Elephants."

Plants geographically off-center—paying the penalty of heavy freight charges—are often more to blame for dwindling profits than "the times."

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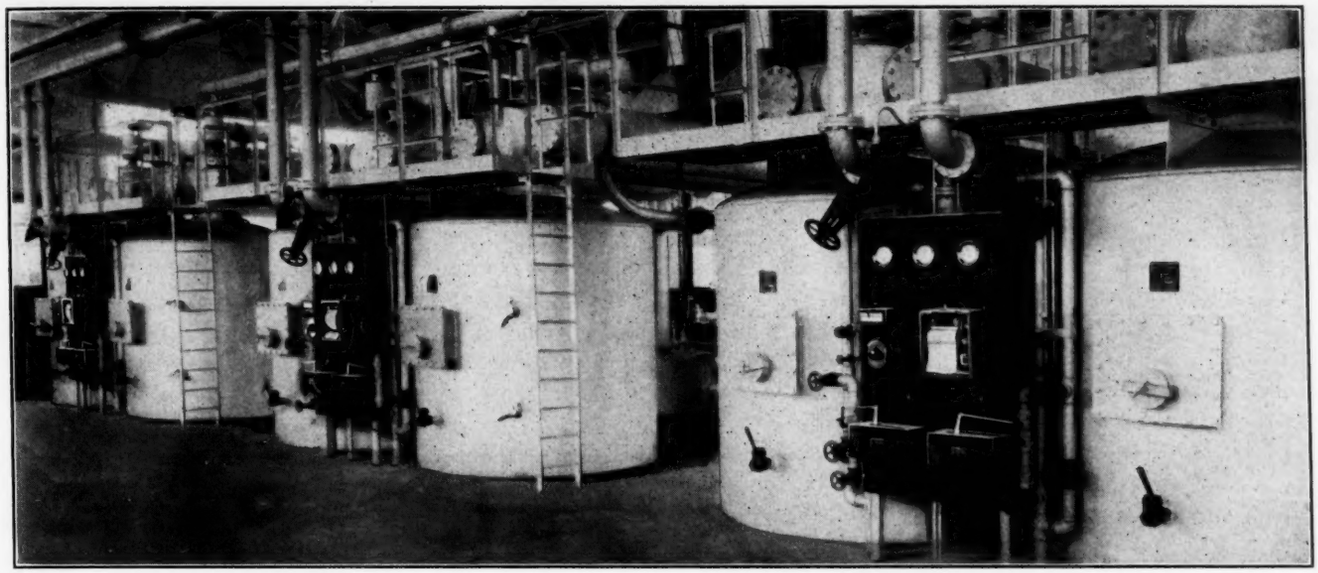


Control Methods In Chemical Operations*

By Dr. G. A. Perley

BEFORE an industrial process can be continuously controlled there must be methods and equipment available for the measurement of the factors to be controlled. This represents the first step towards control development. Indicating equipment for the measurement of temperatures, pressures, hydrogen-ion concentration, salt concentrations, gas composition, colours, etc., of a diversified type and with varying degrees of accuracy, have been on the market for years. Control would be impossible without these types of indicating equipments, and the accuracy of control is essentially connected with the precision obtainable in the indicating equipment. The second step towards the accomplishment of continuous industrial process control is to convert the indicating instrument into a recording mechanism. Not all indicating methods are easily adaptable to recording, yet the application of such modern appliances as potentiometers, Wheatstone bridges, vacuum tube circuits, and photo-electric cells are opening a vast storehouse of tools for the solution of recording problems.

In the last two years a variety of vacuum tube circuits and photo-electric cell equipments have been finding new applications in the industries as recording and controlling devices. As has been often pointed out, a beam of light does not corrode or dissolve, and it is frictionless. Colour, refractive index, etc. have been the means of measuring concentration, rates of settling, etc. through the agency of the more modern equipment involving the use of a photo-electric cell. In view of the rapid advances made in the manufacture of vacuum tubes and the great sensitivity of these to changes within the circuit, we are tempted to forget the problems of specific tube characteristics, reproducibility, freedom from drift, etc. The purpose of this article is to present, in review, some time-tested principles in use in the field where the maximum constancy over a long period of time has been rather well established.

The more important factors requiring control in chemical industry to-day are temperature, pressure, humidity, composition as applied to the gas phase as well as to hydrogen-ion concentration, weight and volume, flow, specific gravity, liquid level, and even time.

It would seem then that a discussion of process control methods would logically consider: (*a*) indicating instruments as a means of analysis, (*b*) recording equipment for continuous measurement, and (*c*) control mechanism for automatic regulation.

It is not within the scope of this paper to discuss the varied methods and apparatus which the chemist utilizes in chemical analyses pertaining to the control of an industrial process. It is obvious that the choice of apparatus depends to a great extent upon the character of the process and the accuracy demanded. The year-book of the American Society for Testing Materials alone embodies some 2000 pages, involving

*Presented before Montreal Section, Society of Chemical Industry.

nearly 500 standard specifications, covering crude petroleum, cement, rubber, copper, asphalts, non-ferrous alloys, etc. Thus it is evident that it is a hopeless task to deal in other than generalities as to methods when treating with the broad problem of control. However, it is important that the method of analysis be of such a type that it provides a means for recording and automatic controlling when the ultimate aim is that of close process control. A very large number of the ordinary laboratory chemical methods are not adaptable directly to a recording process and, hence, as such are not important as a modern control agency.

It is doubtless unnecessary to point out that the indicating methods are fast giving way to recording methods in our chemical industries. The industrial recorder, as applied to the general chemical industry, is now considered as a very distinct advance over the less informative indicating equipment. The recording instrument places on record the conditions obtaining over the whole operation. Thus we have an insurance against possible errors in observation. In addition, the recorder is distinctly a labour-saving device.

Probably the best argument for recording equipment is the fact that the records enable far better regulation than do indicating data as obtained from single and intermittent analyses. The continuous curve upon any process gives not only the momentary condition and the direction of change of that condition, but there is given the rate of change of that condition with respect to time (the first derivative) as well as the rate of change of the rate of change (the second derivative). Thus an operator who utilizes recording equipment knows at any moment in what direction and to what degree any particular variable under observation is progressing. Certainly these are vital points to any accurate process control.

A few of the more important advantages of automatic control are: Improved quality, decreased spoilage, greater uniformity, increased production, and decreased labour costs.

However, the utilization of an automatic control system accomplishes what is practically impossible when employing manual operation. There are many processes where the human factor prevents the necessary large number of simultaneous adjustments which are required to secure rapid and uniform control of conditions. An automatic controller is merely the equivalent of an automatic intelligence capable of observing facts as produced by a continuous record and adjusting the conditions in accordance with the facts within the shortest interval of time. Hence automatic control is a logical step in the trend of advance of our chemical industries, and it is a scientific advance of important scope.

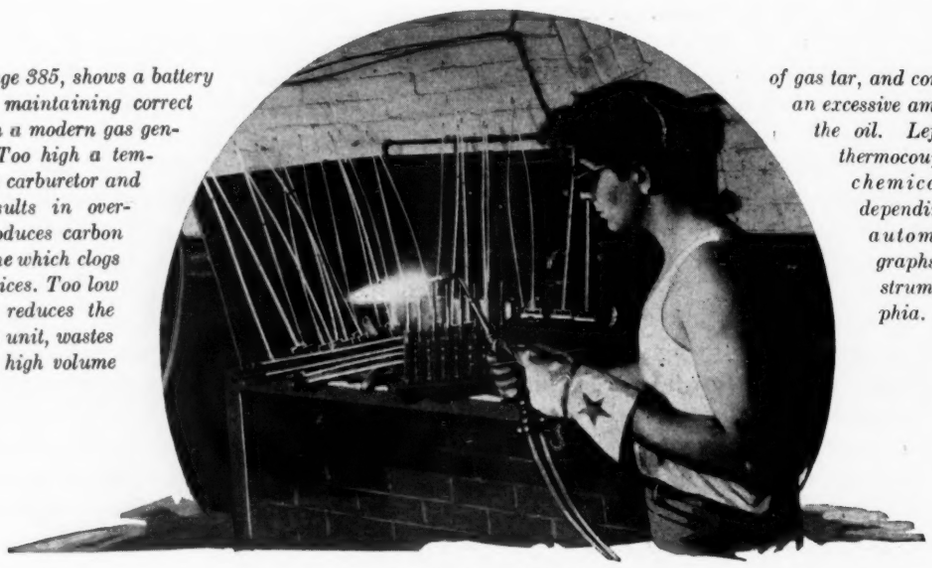
There is a fundamental difference between indicators or recorders and controllers. The former two are accessories for the operation of a process and may be used for a variety of operations. On the other hand, a controller is definitely related to a particular unit. It is adapted to operate a valve or a damper or a rheostat, usually through electrical means. The design of control equipment depends on the demands and factors involved in each individual case. There are available many types of control instruments and valves for the purpose of automatic adjustment.

The operating efficiency of an automatic control system requires high accuracy and constancy over continuous service. Automatic controlling equipment is available with the accuracy of the corresponding recording apparatus.

During the past few years there has been a distinct tendency towards the utilization of electrical recording instruments for the measurement and control of non-electrical conditions. The following are only a few of the non-electrical quantities which are now being successfully recorded by means of electrical measuring equipments: Temperature, pressure, gas compositions, humidity, chemical concentration, acidity and alkalinity and fluid flow.

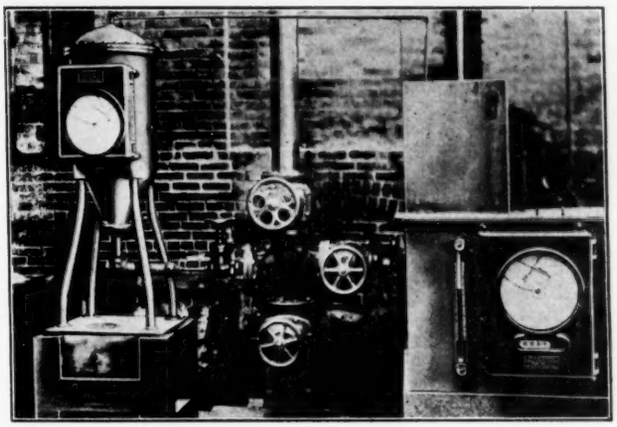
The value of the electrical method is several fold. First: The electrical method provides a means for

Photograph, page 385, shows a battery of pyrometers maintaining correct temperatures in a modern gas generator series. Too high a temperature in the carburetor and superheater results in overcracked oil, produces carbon and naphthalene which clogs mains and services. Too low a temperature reduces the efficiency of the unit, wastes oil, produces a high volume of gas tar, and compels the burning of an excessive amount of fuel to crack the oil. Left, operator welding thermocouple wells. Modern chemical operations are depending more and more on automatic control. Photographs, courtesy Brown Instrument Co. of Philadelphia.



recording and controlling certain types of processes which could not otherwise be controlled at all. There are countless applications of this point. The power plant turns to the chemist for all sorts of help. One of the many applications is the detection of surface condenser leakage, particularly in stations using saline waters for cooling. This means the elimination of "salted up" boilers and also reduced tendency to scaling. A conductivity equipment is a very effective and simple means in the control of the feed water and its impurities, as well as the concentration of the boiler water. Then, too, within the water works field there are other important applications of this prinicple. It is recognized that a minimum quantity of alum is required for the best clarification only within a certain range of hydrogen-ion concentration. The recording and control of this correct p_H is easily available with a modern solution feed quinhydrone electrometric control. It is difficult to see how the actual hydrogen-ion concentration could be secured by a strictly chemical method. There are many other examples of this general case.

Second: The accuracy of measurement of certain electrical methods is far greater than some of the direct and less sensitive non-electrical methods. One of the more outstanding cases under this head is that of temperature measurements with electrical resistance thermometers. This, by the way, is one of the most precise of measurements. With a Mueller thermometer bridge accuracies of the order of 0.02° F. are possible up to 200° F., and 1.2° up to 900° F. Different measurements can be made to 0.0004° F. In the oil refining industry the maximum yield requires accurate control. When producing butane with a high-pressure fractionating tower, production depends on the accurate temperature control of the liquid in the tower. Control equipment must maintain accurate temperatures regardless of the amount of non-condensable gas being charged to the tower. It has been common practice to create a 5% daily saving on a 5000 gallons of butane production by employing automatic temperature control within 1 to 2° F. In the manufacture of sulfuric acid it has been found that a part of the temperature regulation can advantageously be held within 2° F. of the desired operating temperature, and thus the electrical resistance thermometer comes into action. The accurate control of the temperature of small batch lots of all kinds of chemical preparations is often a challenge to the ingenuity of the chemist in charge. Many times a very small element or detector in the form of an electrical resistance instrument is utilized to minimize the time lag, and thus rapid fluctuations can be accurately recorded. Then, again, a large temperature detector may disturb the temperature condition, and hence it is of advantage to use the smallest possible elements. The chemist in the canned food industry has found that the small electrical temperature detector, as mounted in one can, gives temperatures which are representative of the whole lot undergoing processing. The use of large elements would certainly involve errors. Heat treatment, to change the physical properties of steel to meet given conditions, must yield the exact structure without external changes. The Hump method requires for its success a single-point recording potentiometer, an electric furnace with control equipment, and an adjacent tank for quenching. The exactness of reproduction in hardening of steels by this method is really astonishing.



Installation of a Weir meter and a gravity recorder at the S. O. Warren Paper Co. In this installation, the combined waste liquor and wash water are passed through the Weir meter and Gravity Recorder on the way to the evaporator. Thus a record of the specific gravity and quantity of the black liquor is obtained, enabling the evaporator operator to regulate the steam to the evaporators so as to maintain the gravity of the liquor delivered to the rotary furnaces at the standard desired. Courtesy Bailey Meter Co., Cleveland

Third: Certain types of control depend upon the actual concentration of ions within the solution, and hence the electrical measurement becomes a direct method as contrasted to the indirect chemical estimation. The direct electrical method should then be more rapid than the chemical. As one of many illustrations may be cited the automatic control of the strength of acid in a mercerizing process. The electrical conductivity of the solution depends upon the concentration of ions of the acid present. To control the concentration of acid, a conductivity cell in the bath is made to form a part of the electrical circuit in an instrument that is sensitive to changes in conductivity, and responds in one direction to an increase, and in the opposite direction to a decrease, in concentration of acid. In responding to such changes, the instruments can be made to operate a valve mechanism that regulates the flow of acid to the bath, until the conductivity is equal to that of a solution with the required concentration of acid. Thus is the acid strength maintained rapidly and continually within narrow limits.

Fourth: The electrical measurement which is made at one point may be transmitted to recorders or controllers located at a distance from the process. One of the more noteworthy modern illustrations is the long distant pressure recorders utilized over a distance of 15 or more miles. This feature is too common to warrant specific examples.

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While the above four features qualify the reasons for the more modern trend towards the adoption of electrical measuring instruments, particularly in connection with recording apparatus, the application of such equipment to automatic control devices is obviously an important consideration.

Every modern industrial chemist should have an appreciation of some of the fundamental considerations involved in the design of efficient recording and controlling apparatus. There are two broad types of electrical measuring circuits which are employed by the chemist in a wide variety of indicating and recording equipment. These are: (*a*) The potentiometer circuit; and (*b*) the bridge circuit, such as Wheatstone and Kelvin bridge.

The potentiometer to-day is a very important instrument in the hands of the chemist, and is more than a laboratory tool. In the United States there is a production of approximately 1000 standard cells per month, and over 90% of those are sold for industrial measurements. The true potentiometer method is concerned with a null measurement. A null method is a balance method in which a known quantity is balanced against an unknown quantity, and a detector shows that there is a perfect balance when it remains in its null or zero position.

The potentiometer may be applied to any method of analyses which becomes a source of electromotive force. It makes little difference whether this is the electromotive force set up by two metals where the junctions of the metals are at different temperatures, or whether it is a potential difference resulting when two electrodes are immersed in a solution that contains hydrogen-ions, or whether it is the extent of unbalance produced in a Wheatstone bridge caused by changes in resistance of the wire in one arm of the bridge due to a change in thermal conductivity of the gas surrounding that wire.

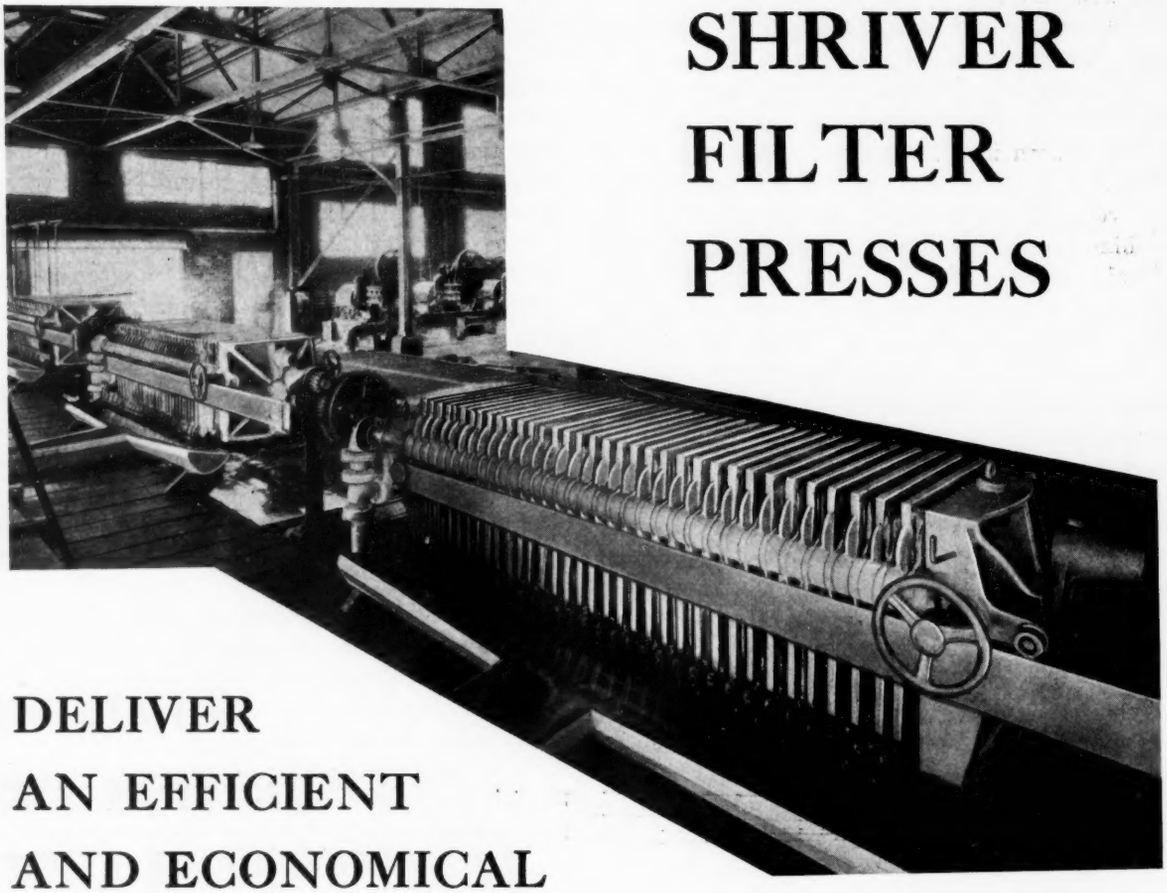
An outstanding use of the potentiometer in the chemical industry is in the measurement and control of temperatures. However, there are important applications in many other fields. The fundamental principle behind the use in temperature measurements is that the voltage produced in a thermocouple bears a direct relation to the temperature. The voltage produced may equally be related to hydrogen-ion activity or indirectly to gas composition. The United States Bureau of Standards (1) (Technologic Papers No. 170, 1921, p. 43) points out that the most accurate method for measuring the *E. M. F.* of a thermocouple is by use of a potentiometer.

General Advantages of Potentiometer Method

The potentiometer provides, first a means for securing a known variable potential, and, second, suitable electrical connections for opposing that potential to the unknown electromotive force. The two are connected electrically, so that they oppose one another. So long as one is stronger than the other, a current will flow through the circuit containing the source of unknown *E. M. F.* When the two are equal no current will flow, and it is this fact which makes measurements with the null potentiometer independent of the resistance of the external circuit. The calibration of a potentiometer scale, as contrasted to certain other measuring equipment, is in no way dependent upon the constancy of magnets, springs, bearings, or changes in tube characteristics. The greatest advantage in its use is the complete elimination of any error due to ordinary changes in the resistance of the external circuit. The resistances of industrial solutions vary over a wide range, and the elimination of the conductance factor is important to the chemist. As a matter of fact this is the most important feature of the use of a potentiometer in continuous recording equipment in the chemical industry, irrespective of whether it is a temperature measurement or a hydrogen-ion determination. Connecting wires between the source of the *E. M. F.* and the recording instrument also have an appreciable resistance, which varies with the surrounding temperature. Changes of temperature or composition in any part of the circuit comprizing a source of *E. M. F.* may also affect the resistance. In the null potentiometer no current flows through the detector at the time the measurement is made, and this is the chief reason why such measurements are independent of the resistance.

Accuracy and Sensitivity

The recording potentiometer system has gone through a very scientific study and its development has produced a distinctly satisfactory instrument. The problem of sensitivity is only one of the many interesting features. This is well illustrated by the familiar potentiometer temperature control, which has been of the greatest value in such industries as the heat treatment of steel, the manufacture of cement, the cracking of oils, the manufacture of glass, and many chemical preparations. The best thermocouples available produce only a very small electromotive force. At 500° F. we may obtain something like 15 thousandths of a volt and at 1500° F. we may develop an *E. M. F.* of approximately 50 thousandths of a volt. The recorder must accurately deal with 5° F. or better at 1000° F., and hence an accuracy of 2 ten-thousandths of a volt must be secured. These small voltages certainly can produce only very feeble currents in an ordinary circuit. The instrument maker must continue to design and build a recording pyrometer which will operate reliably from the feeble currents which the present types of thermocouples produce. When the chemist can prepare an alloy which will generate a higher *E. M. F.* than the present-day couples, the problem of the instrument maker will be made easier. However, great accomplishments have been made, and although the recording of temperatures by means of a potentiometer is not in-



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expensive or simple, yet it is accurate, and after all that is the first fundamental established in the training of every chemist. A similar situation prevails in the measurement of hydrogen-ion concentration. The potentiometric equipment is available for an accuracy greater than that which is obtainable by any electrode now on the market. Even so, we have hydrogen-ion recording potentiometers on 24-hour service, producing records with an accuracy of 0.05 p_H, and this involves the accurate measurement of the equivalent of three thousandths of a volt.

However, the control of many industrial processes can easily be accomplished through the second general type of electrical measurement previously mentioned. Again it is assumed that all are familiar with the fundamental circuit of the Wheatstone bridge. The resistance to the flow of an electrical current between metal electrodes immersed in a solution varies with the concentration of salts present. Likewise the resistance of a wire exposed to a gas mixture will vary with its temperature, and the temperature of this wire will vary according to the rate at which heat is conducted from the wire to the walls of the enclosing chamber. Hence we have possible the accurate and rapid measurements of such a variety of things as the ash content of sugar and similar solutions, the contamination of boiler feed water, the strength of various acid solutions, or the percentage of carbon dioxide in a flue gas, the detection of the acetone content as it approaches the explosive limit in an air mixture from a solvent recovery, the determination of the amount of water vapour in air from zero up to saturation within a temperature range of $-100°$ to $+200°$ C., etc.

Uses of the Wheatstone Bridge

A study of the various electrical methods has shown that the alternating-current Wheatstone bridge method is of great use. Electrodes may thus be installed in pipe lines and insulated by the installation of a transformer. The use of a balanced bridge makes the results independent of line voltage. A sensitive detecting instrument, such as a galvanometer, makes it necessary to pass only a very minute current through the electrode circuit, thereby reducing the polarization error to a negligible quantity, even when the electrodes are permanently installed within pipe lines. A convenient automatic temperature compensator can be made a part of a balanced Wheatstone bridge equipment thereby reducing the changes caused by the temperature coefficient to a minimum. Of course such an equipment lends itself admirably to continuous recording on either single or multiple point equipment.

A feature common to the null potentiometer and the balanced Wheatstone bridge is that the accuracy of the measurement is not influenced by changes in characteristics of the indicating instrument. Too much emphasis cannot be placed on this point. The galvanometer does not measure anything, but it shows the absence of current in the branch of the circuit in which it is connected when the bridge is properly balanced.

The development of a cell for permanent installation within a pipe line requires a very careful study of conditions, and the specifications for such depend greatly upon the conditions of service.

A Few Industrial Applications of Control

The thermal conductivity principle for gas analysis is quite widely used. As is well known, gases differ markedly in their ability to conduct heat. If the conductivity of air be taken as unity, conductivities of other gases range from that of hydrogen at 6.95 to carbon disulphide vapour at 0.284. The conductivities of gas mixtures depend upon the nature and relative amounts of the gases present. When a fine wire is supported in a tube and heated by an electrical current, heat will be lost by conduction through the gas. Hence the equilibrium temperature of the wire depends on the thermal conductivity of the gas. By using a wire of platinum, which has a definite temperature coefficient of electrical resistance, it is possible to measure the wire.

A typical conductivity control is carried out in the mercerizing industry. The control of the acid bath, which is used for neutralizing the caustic carried over in the yarn after the mercerizing, requires close control for many obvious reasons. An automatically-operated valve in the acid line maintains the acid bath at constant acidity. One arm of a conductivity bridge is made up of a closed conductivity cell containing the concentration of acid which it is desired to control, while the other arm contains a similar cell which is open to the liquid. Both cells are immersed in the bath and hence both will be at the same temperature. The two cells comprise opposing elements of a regular conductivity measuring circuit which is placed on a recording and controlling mechanism directed by the galvanometer swing. Without greater detailed discussion it is obvious that this equipment opens up many interesting problems of control in the general chemical field.

Hydrogen-ion control in many industries is so well accepted that it is only necessary to indicate that electrical measuring equipment with a very high degree of accuracy is being used, and that the control of many operations within $0.05p_H$ is being secured through the use of a quinhydrone flow type electrode. This particular application will find greater uses as soon as its general principles are recognized by operating chemists.

In his address of acceptance of the Perkin Medal award the late Herbert H. Dow pointed out that "The immediate developments before us point more and more toward the installation of continuous processing wherever possible." Certainly recording equipment will make this an easier problem.

Chemical Wages

Compared for 1914-30 With Other Industries

WAGES and employment statistics for the period 1914-1930 have just been released by the National Industrial Conference Board in its book "Wages in the United States." Chemical industry (manufacturing) stands twelfth in the list of industries in average hourly earnings and twelfth also in average weekly earnings. The hourly average earning in 1930 was greater than the 1920-1929 average, standing at 55.0 cents for 1930 against 53.4 cents for the ten year period.

The average weekly earning for 1930 was $26.12 against $27.26 for the ten year period. These figures are based on all wage earners in the manufacturing end of the industry and do not include executive or sales divisions of the companies included in the survey.

Printing was the highest paid industry in 1930, 84.6 cents an hour and $38.22 per week. Some of the industries higher in the scale than the chemical were automobile, rubber, paint and varnish; some of those below in both the hourly and weekly rate, were paper and pulp, tanning, and textiles. The poorest in either rate was cotton (north) 41.1 cents and $18.36.

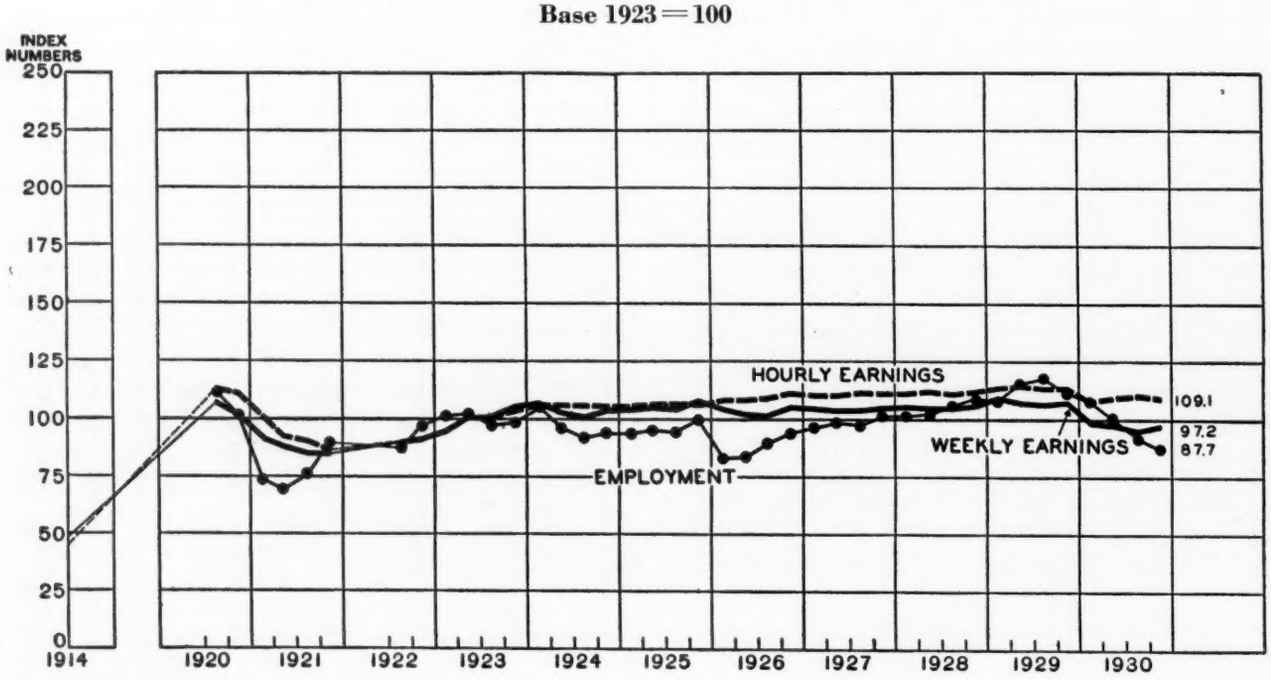
Another interesting comparison is the growth in chemical wages in the period 1914-1930. Annual average weekly earnings, male, skilled and semi-skilled in chemical manufacturing were as follows:

July	1914	$15.15	July	1925	$31.78
"	1920	32.84	"	1926	30.28
"	1921	27.22	"	1927	30.11
"	1922	27.97	"	1928	30.63
"	1923	30.75	"	1929	31.04
"	1924	30.95	"	1930	28.15

Annual average weekly earnings for unskilled help in the chemical industry for the same period were as follows:

Chemical Manufacturing Indexes of Earnings and Employment, All Wage Earners*

Base 1923 = 100



*National Industrial Conference Board

July	1914	$12.48	July	1925	$26.53
"	1920	26.49	"	1926	27.72
"	1921	22.24	"	1927	28.81
"	1922	22.84	"	1928	28.71
"	1923	25.59	"	1929	29.02
"	1924	26.41	"	1930	27.15

The annual average hours of work per week in manufacturing form still another interesting comparison.

	Hours		*Hours*
1914	57.2	1925	52.8
1920	49.4	1926	50.2
1921	50.0	1927	50.0
1922	53.2	1928	50.3
1923	53.2	1929	50.4
1924	52.3	1930	47.5

Only meat packing, paper and pulp, iron and steel, paint and varnish industries show larger averages of actual hours of work, while printing, tanning, electrical manufacturing and automobile industries are among the sixteen industries showing averages below the chemical.

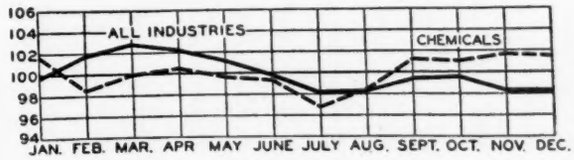
A study of the annual average indexes of employment in manufacturing for twenty-one industries shows how comparatively stable employment in the chemical industry has been. The index for the chemical is as follows:

1920	106.5		1926	87.4
1921	76.9		1927	98.5
1922	91.6		1928	104.1
1923	100.0		1929	112.9
1924	96.5		1930	96.7
1925	95.7	Base	1923 =	100

The drop between 1929 and 1930 was larger in agricultural implements, automobile, furniture, electrical manufacturing, lumber, and rubber than in chemicals and not so great in twelve others. The index for all industries stood at 100.2 for 1929 and 86.0 for 1930 against 112.9 in 1929 for chemicals against 96.7 in 1929, a greater drop by two points. The drop in 1930 in chemical employment was very slight however, when compared with the 1920-1929 average the two figures being 96.7 and 96.8 respectively with 1923 = 100 as a base.

Seasonal variation in chemical employment is larger than is generally supposed. The low point is at the beginning of July and based on an 1923-1929

Seasonal Variations In Chemical Manufacturing Employment



average the per cent. change from the low to the high point is 5.1; the per cent. at the high above the average of the year is 1.7 and the per cent. below the average is 3.2. Chemical industry stands sixth in the list of twenty-one in ranking for the least amount of seasonable variation of employment.

These figures are interesting and valuable to plant executives at a time when wages and hours of employment are of prime importance. They form a splendid average of comparison for those charged with the problem of affecting wage readjustments now.

Chemical Construction

Stauffer Chemical, San Francisco, has awarded contract for the design and construction of two additional plant buildings to The Austin Company to be erected at Vernon, Calif., and represent an investment of $50,000. Both units will be used for the manufacture and storage of fertilizer products, one being 88 by 140 feet and the other 36 by 60 feet. Contract calls for completion in 30 working days.

Armstrong Cork and Congoleum-Nairn are said to be planning two large linoleum plants at Martinex, Cal.

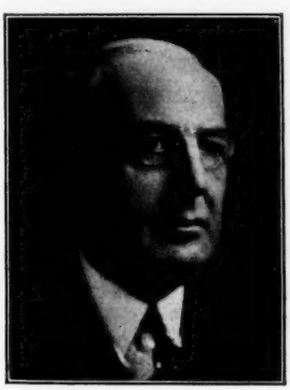
Dow Chemical, Midland, is planning the construction of a new rolling mill for its magnesium department.

Corn Products Refining has announced plans for an addition to its Mexico plant.

John T. Stanley is altering its large soap factory at 646 W 30th St., N. Y. City.

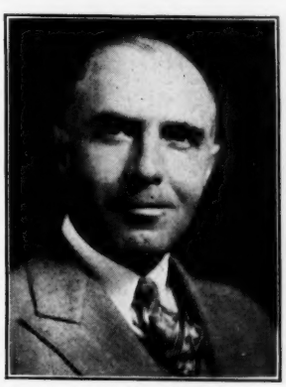
California Institute of Technology is asking bids for a new chemistry building at Pasadena.

Chemical Executives In Last Month's Headlines



HORACE BOWKER
who will again head the chemical division of the Metropolitan Emergency Relief.

Dr. E. H. KILLHEFFER
who is in Europe re-arranging Newport's foreign connections in Europe.

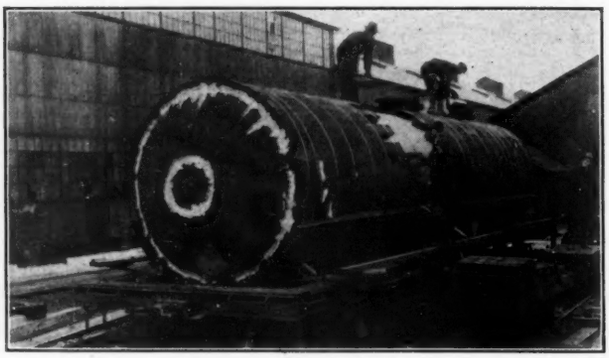


H. L. DERBY
who is re-nominated for a directorship in the National Association of Manufacturers.

WILLIAM H. NICHOLS
who is to receive the New York Section A. C. S. medal.

Transporting Gases Under Pressure

Rapid development in the commercial introduction of new chemicals is causing rapid changes in modes of transportation. General American Tank Car has constructed a new high-pressure tank car suitable for the handling of butane and similar products. Certain peculiarities about the application of the insulation of cork is of special interest.



The cork blocks are the total thickness of the insulation. That is, for insulation 4-inch thick, the blocks are 4 inches thick. This is a very distinct advantage over the usual application of insulation, wherein a 4-inch thickness is made up of either four 1-inch blocks or two 2-inch blocks. In either of the latter methods of application cork is rubbing on to cork and inasmuch as the various layers are merely stapled together, there is a very definite movement when the car is in use, which quickly pylverizes the cork and greatly deteriorates the insulation.

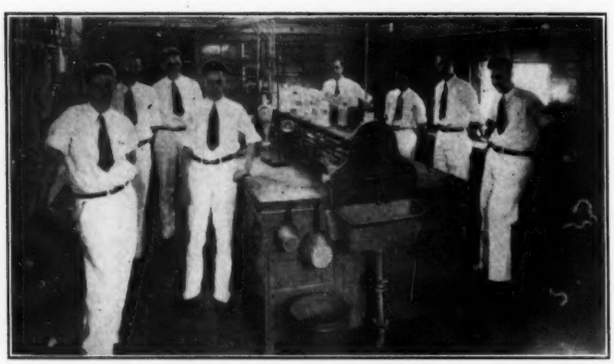
With this method of application the cork is held firmly between the metal of the tank and the metal jacket, and retains its form indefinitely.

As shown in the photograph, the cork is strapped on to the tank with bands drawn tight and held tight by special buckles. This is quite different from the usual method of application which consists of merely holding the cork in place by wire and depending on the metal jacket to properly retain it in place.

The edges of the blocks are so cut radially as to make a continuous tight surface.

Monsanto Dresses Up Its Chemists

Monsanto has inaugurated a new idea in the adoption of white garb at Plants "A" and "B" to give manufacturing and chemical



Not a hospital, but the research laboratory at Monsanto Plant "B"

control and research departments an added appearance of neatness and efficiency. Plant management ideas such as this one are finding wider application in the industrial chemical field. Monsanto plant officials are enthusiastic and plan to extend the idea to the other Monsanto and subsidiary plants.

Steel Barrel Monthly Report

The Steel Barrel Institute consolidated monthly report for August shows total volume of business for 16 reporting members to be $573,631.28. Actual production compared with possible capacity for the several grades was as follows: I. C. C. barrels and drums, 250,625—6.3%; light barrels and drums, 883,125—27.9% total for all types, 1,133,750—23.1%. A total of 10,668 I. C. C. black, 4,789, I. C. C. hot-dip and galvanized, 307 I. C. C. black removable head friction cover and 232 I. C. C. hot-dip and galvanized. Figures for drums not of the I. C. C. requirements were as follows; black 200,817; hot-dip and galvanized 3,659; in the removable head friction cover group, black 42,953, hot-dip and galvanized 260. A grand total of 413,357 drums on order remained unfilled on the last day of July.

New Incorporations

Bicks Chemical Co.—Strongin & Hertz, 189 Montague St., Brooklyn, $20,000.

Continental Chemical Corp.—S. Berg, 215 Montague St., Brooklyn, 10,000.

State Exterminating Co., Union City N. J.—Adelman & Adelman Delaware Charters, 100 shs com.

Kim Chemical Products Co—Colonial Charter Co., Wilmington, Del., 150,000.

Southern Mineral Development Corp.—Corporation Trust Co., Wilmington, 500,000.

Equipment Bulletins

Plant Managers, plant engineers, consultants, those in charge of operations, and purchasing agents will find in this column valuable suggestions in the way of new booklets bearing on equipment, etc.

The Plant Management Department of Chemical Markets will be glad to forward requests for the above booklets to the proper channels for attention should this be preferred.

Elliot Co., Jeannette, Pa., has just released bulletin G3 covering fractionating condensing and vacuum equipment.

C. O. Bartlett & Snow Co., Cleveland, O., an attractive 32 page booklet describing 11 types of driers together with valuable technical data.

Foster-Wheeler, 165 Broadway, N. Y. City, a 56 page booklet describing several installations and the general design of Foster-Wheeler petroleum refining equipment.

Brown Instrument Co., Philadelphia, an illustrated leaflet showing several models of potentiometer pyrometers.

Brooke Engineering Co., 3640 N. Lawrence St., Philadelphia, a leaflet describing how constant steam pressure may be maintained by means of pressure regulators.

Charles Engehard, Inc., Chestnut St., Newark, N. J., a 6 page leaflet on the new portable Gasalyser.

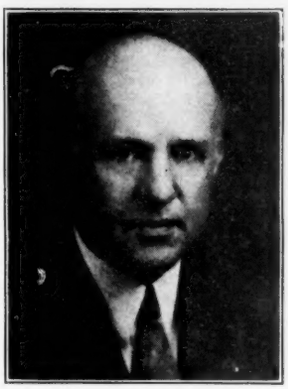
Chemical Germany Fetes Dr. Duisberg

Industrial Germany celebrated the seventieth birthday on Sept. 28 of one of her outstanding leaders, Dr. Carl Duisberg, president of the Federation of German Industries and chairman of the Board of Directors of I. G. Farbenindustrie. A memorandum in 1904 by Dr. Duisberg resulted in a "community of interest" agreement in the German chemical industry and gradually resulted in the formation in 1925 of I. G. Farbenindustrie, which is the country's largest industrial organization and one of the greatest in the world, and of which he may in a sense be called the "father." Aside from administrative and research work, Dr. Duisberg is a leader in student self-help plans and the development of education.

Chemical Facts and Figures

Manufacturing Chemists' Association Favors Six Hour Day—Muscle Shoals Commission Meets—Feldspar Hearings Held—O'Shaughnessy Resigns—Huning, Mallinckrodt, V. P., Dies

Chemical industry is expected to adopt the six hour day with present hourly wage rates maintained, W. D. Huntington, chairman of the executive committee of the Manufacturing Chemists' Association



W. D. Huntington sees President Hoover

and vice-president of Davison Chemical told President Hoover at a conference at the White House on October 1.

Mr. Huntington stated that this action on the part of many of the members of the association would have the effect of increasing employment by approximately one-third. He further stated many plants have already changed over from the eight to the six hour day and others are adopting the plan shortly. In some of the continuous processes, he explained and in certain other types of high skilled work the plan would be impractical. The President was reported as giving the Association's recommendations his hearty approval.

Willard H. Dow Comments

Willard H. Dow, Dow Chemical president, commenting on the present unemployment situation, stated that, "Personally, I have my own theory that the only cure for unemployment is the six hour day, that a dole is a cure for nothing and since the appointment of the Unemployment Commission, I have been hopeful that these industrial leaders would also find a cure for unemployment that might be something different than a dole."

"It might be that Mr. Swope can see in the G. E. Co., a cure for unemployment by some kind of unemployment insurance. I cannot imagine how any sort of an idea of this kind could possibly apply to the chemical industry. We have tried out a number of experiments at Midland. We have one plant which is operating on four-eight hour shifts, by which I mean that one shift is continually off, but the shifts so rotate as to give continuous employment. We have another system, which is my preference, in which the plant operates four-six hour shifts. By going to a six hour shift you can readily see that we could increase our employment by one-third. We can bring about a situation in Midland, due to the number of men we could put on, so as actually to make a house shortage. We could develop an artificial prosperity that would not seem basically a wise thing to do."

"On the other hand, if every manufacturer in the country should do the same thing, even assuming that they are now working short hours, but that it be understood that no man would get an excess of a certain number of hours a week, I cannot help but think that a lot of our troubles would be over."

"Personally I am very optimistic as to the possibilities for the future. Just a slight change in conditions is bound to bring about general improvement and we all feel that the chemical industry will notice the first gains."

Willard H. Dow favors 6 hour day

THE MONTH REVIEWED

Sept.

1 Muscle Shoals Commission suggests President has power to dispose of properties (396).

5 Chemical Foundation sustained in royalty suits (396).

15 Al Alvarez again chemical golf champion (384).

17 Feldspar industry heard by Tariff Commission (398).

25 Copperas higher, bismuth and magnesium metals lower (409).

26 Chemical stock values go below June low figure (401).

Deaths

C. Harold Smith, Aug. 31.
Bernard F. Drackenfeld, Jr. Sept. 5.
Thurston Dissoway, Sept. 5.
Henry W. Huning, Sept. 14.
Frank R. Corwin, Sept. 15.

Shoals Commission Meets

President Hoover's Muscle Shoals Commission apparently hit into a snag when they opened bids for the plant recently. Only seven were received from the total of 136 chemical concerns solicited (see Chemical Markets, Sept., p. 294). Among those submitting proposals are the names of the Chemical Development Co., Davison Chemical Co., Alabama Power Co., and Tennessee Electric Power Co. The Commission is hoping for a definite bid from the American Farm Bureau Federation. No doubt the Commission's expectations are based upon the resolution adopted at the annual meeting of the Federation at Boston on Dec. 10, 1931 which in part was as follows:

"We favor such disposition of this project as will get the most fertilizer for agriculture, will retain title in the government of the United States, will use all the power necessary at Muscle Shoals for making fertilizers and dispose of the remainder so as to benefit agriculture, and preserve the public interests."

The Board of Directors of the Federation was authorized and directed to set up a special committee with authority to develop and organize a corporation for the purpose of leasing and operating Muscle Shoals on a cooperative basis.

In the meantime this greatly discussed subject appeared in a new light when it was announced that legal advisors of the Commission have reached the tentative opinion that the President is empowered to sell the Federal plant at Muscle Shoals. A brief containing their findings probably

This State-Federal Commission met in Washington, September 1 to consider plans for disposing of the nitrogen fixation and power plant at Muscle Shoals. Left to right front: W. F. McFarland, Florence, Alabama; W. R. Hobbs, Selma, Alabama, Chairman; Col. Joseph I. McMullen, U. S. Army; Col. Harvey Ferguson, Corps of Army Engineers; Mercer Reynolds, Chattanooga, Tenn.; Standing: R. L. Moore, Jellico, Tennessee; Will Howard Smith, Prattville, Alabama; Edward A. O'Neil, American Farm Bureau Federation; J. F. Porter, Columbia, Tenn.; Major George P. Hill, Judge Advocate General's Department; Col. Max Tyler, Army Engineers; and Captain Thomas H. Green, Secretary

will be submitted to the Attorney General to see if he concurs, it was said.

The Commission itself has no authority to dispose of the Muscle Shoals property, whatever may be the legal findings, but if it should be determined that the President's power already is sufficient to provide for the executive sale of the plant, the scope for recommendations by the Commission would be considerably enlarged. Hitherto, the announcements by the Commission have limited its objectives to the making of recommendations to the President for the formulation in turn of the President's future recommendations to Congress.

The Commission's legal advisors base their opinion as to the President's authority particularly on the National Defense Act of 1916 and the Act of July 9, 1918, authorizing the President to sell war supplies, including plants and factories acquired after April 6, 1917, with the exception of Dam No. 2 at Muscle Shoals, it was said.

President May Sell ?

A combination of all these acts of Congress, it was stated, makes it possible for the President to dispose of all the Muscle Shoals property without further authorization from Congress. Under this construction of the law, it is held that any contract entered into by the President on recommendation of the Commission would not be subject to further legislation by Congress.

That the assumption of any such final power by the President would be fought bitterly by Congress appeared to be a certainty. Senator Walsh (Dem.), of Montana, said: "It is inconceivable that the executive department of the Government would attempt to finally dispose of the property without approval by Congress."

Senator Brookhart (Rep.), of Iowa: "It looks to me like another attempt to steal the project. The whole proposition has been considered by Congress for many years and it is for Congress to finally act on the question of sale of the plant. The progressive group in Congress certainly is for Government operation of Muscle Shoals and we are going to stick to Government operation."

Representative Steagall (Dem.), of Ozark, Ala., said: "Congress has considered the question of Muscle Shoals for many years and Congress alone has the authority to authorize its sale."

Brand Testifies

The Commission was in session only two days. At a brief visit at the White House it is understood that the members were told of the President's opposition to government operation. Two interesting witnesses heard were Charles J. Brand, secretary of the National Fertilizer Association and Dr. Perry E. Howard, nitrogen expert in the Fixed Nitrogen Research Laboratory.

Mr. Brand told the commission that there is capacity to produce nitrates in this country to meet all needs for fertilizer and that the only reason why any nitrogenous fertilizers are imported is because farmers have a preference for certain types, such as Chilean nitrate. He asked that the fertilizer industry be not subjected to subsidized competition, declaring that production of fertilizer at Muscle Shoals would not give the farmers of the South anything the fertilizer industry is not giving them, unless such operation is heavily subsidized by the government aid.

Dr. Howard entered into a technical discussion of Muscle Shoals plants and of the nitrogen fixing processes that have been developed since they were built. He explained that there is ample productive capacity among nitrate plants using much more economical processes.

The Commission extended the date to receive bids to Nov. 1, as its last move before adjourning. The next meeting is scheduled for Muscle Shoals early in October.

Chemical Foundation Sustained

Final decree was entered by Judge Robert Nevin of U. S. District Court at Cincinnati on Sept. 5, in the suit of the Chemical Foundation Inc., vs Ault & Wiborg, Cincinnati Chemical Works, Inc., and Walter O. Woods as treasurer of the United States. The decree follows the decision of the U. S. Supreme Court in issues involved in the suit of the Foundation vs du Pont and the treasurer of the United States, involving the Foundation's rights to royalties paid to the Alien Property Custodian for use of German formulas during the war.

Judge Nevin found that the Foundation was entitled to recover from Ault & Wiborg, from funds paid by it through the Alien Property Custodian into the Treasury, royalties totaling $1,802 and to recover from the Chemical Works, royalties totaling $668, the same to be paid from funds in the hands of the Federal treasurer.

Gum Research

Discussion of the work of the research committee of the American Gum Importers' Association featured the last quarterly meeting.

Tennessee Eastman Corp., wholly-owned Eastman Kodak subsidiary, will begin to manufacture acetate yarn in October.

United Carbon has completed enough wells on its eastern Kentucky gas properties to provide for the deliveries which it has contracted to make, beginning November 1, to the Columbia Gas & Electric. The contract provides that United will deliver the first 20,000,000 cubic feet a day to go into Columbia's new pipe line to Washington, and that after a year, Columbia will take at least 30,000,000 cubic feet daily.

International Nickel is further curtailing operations, as result of continued restricted demand for nickel and depressed world trade conditions. About 300 men will be laid off, and the work spread over as many of present employes as can be arranged. Rumors of a wage cut are denied.

Liquid Carbonic now has nine plants in operation producing the new product "Carbonic Ice." Five more plants will be ready shortly, giving the company national distribution from coast to coast.

Commercial Solvents calls attention to the fact that it has no connection with Commercial Solvents, Ltd. of London, England. Recently action was brought by Acetate Products Corp., Ltd., for damages against Commercial Solvents, Ltd., for alleged breach of contract which arose out of its acquisition of a sublicense to work a process for the production of acetic acid.

Monsanto and subsidiary, Rubber Service Laboratories have filed a bill of complaint in the U. S. District Court, Charleston, W. Va., against Kavalco Products and C. Olin North and Winfield Scott, formerly employed by the Monsanto subsidiary. The suit charges that North and Scott organized Kavalco while with Rubber Service, and that North gained release from his contract under misrepresentations and without intimating that he was engaged in forming a competitive enterprise.

Company News

Additional office space has been taken by the Michigan Alkali for its sales force at 21 East Fortieth street. The company will now occupy the entire fourteenth floor.

Swift reduced all salaries 10%, effective September 28.

American Smelting & Refining, largest lead producer in the world, is restarting some of its operations which had been idle since July 1.

Jones & Laughlin reduce wages October 1 approximately 10%.

Southern Alkali, Pittsburgh Plate Glass and American Cyanamid subsidiary, has contracted for an adequate supply of natural gas from nearby fields for fuel, before beginning construction on a $10,000,000 chemical manufacturing plant on Nueces Bay, near Corpus Christi.

Additional source of supply for helium has been obtained by the government in its purchase from Humble Oil & Refining of 11,833 acres of land, situated near Cliffside, Texas.

Consummation of the merger of Phelps-Dodge and Calumet & Arizona was assured when stockholders of the former voted to increase the authorized common stock to 6,000,000 shares in order to provide stock for share exchanges.

Michigan Chemicals, Inc., has been organized at Grand Rapids with a capital stock of $50,000 to develop and manufacture chemicals and chemical compounds. The company will also act as Michigan distributor for Grasselli and Harshaw Chemical. J. C. Miller is president and treasurer of the new company.

Du Pont has made reductions ranging from 23½ cents to 54 cents a pound, according to denier, in the price of its acetate yarns.

The Universal Paper Bag, New Hope, Pa., has just recently equipped their plant with the most modern and up to date bag making machinery available. This new plant is now manufacturing the highest quality kraft Multi-wall paper bags for the cement and pulverized rock products industries.

Charles L. Read & Co., dealers in naval stores, alcohol and chemicals, have completed arrangements for branch offices in Savannah and Jacksonville. This move was necessary by reason of the steady growth which the Read company has enjoyed in the naval stores field.

P & G has adhered 100% to its plan of guaranteeing year-around employment to its factory employes throughout the United States and Canada, and will continue to do so," according to R. R. Deupree, president.

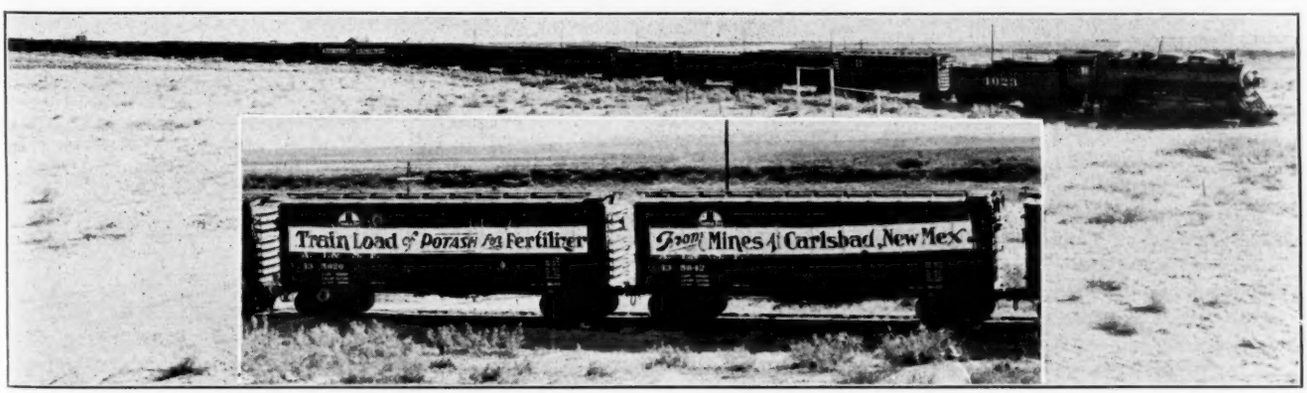
Edgar S. Browning, Rialto Building, San Francisco, California, has been appointed selling agent for the San Francisco Bay region on American Cyanamid's lacquer chemicals. The products included in this line are the well-known group of synthetic resins for lacquer and varnish manufacture known as Rezyls, Nitrocellulose and Nitrocellulose solutions, produced by American Powder, and Aero Brand Ethyl Lactate, a synthetic high boiling solvent.

Mr. Browning is a well-known figure in the Pacific Coast paint, varnish and lacquer industry, being formerly connected with Pittsburgh Plate Glass and Hill Hubbell, now a division of General Paint.

The following members of the research staff of R & H have been transferred from Perth Amboy, to Niagara Falls, plant within the past three months:

Dr. Sterling Temple, Dr. B. S. Lacy, Dr. A. M. Muckenfuss, Dr. J. F. Reichert, Dr. C. J. Wernlund, Mr. A. T. Hawkinson, Mr. A. W. Rudel, Mr. J. M. Wainscott, and Mr. H. A. Bond.

Other transfers to the Niagara Falls plant include: from Perth Amboy: Mr. P. M. Paulson, patent specialist, Mr. M. Marean, librarian from the New York office: Mr. I. L. Ressler, entomologist.



Twenty-seven carloads of potash leaving mines of U. S. Potash Co., at Eddy County, New Mexico, point to the definite establishment of a domestic potash industry

Washington

Washington was the center of chemical activity in the past month. Further arguments before the I. C. C., sent the freight rate hearings into October. Speculation was rife as to the probable findings of the Commission, with the general concensus of opinion being that while the railroads were unlikely to obtain the blanket 15 per cent. asked, they would receive sizable rate increases in many lines.

Feldspar Hearing Stormy

American feldspar producers and importers appeared before the Tariff Commission on Sept. 17 at a hearing held in connection with current investigation of foreign and domestic costs of production.

Conflicting figures, all credited to the Bureau of Mines, were shown, producers,

V. V. Kelsey opposes feldspar duty

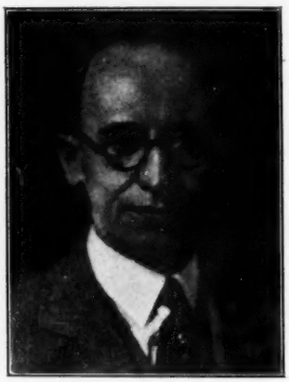
claiming that domestic production has been steadily declining while imports from Canada, chief competing country, have risen, and importers introducing statistics accredited to the same source to show that the amount imported from Canada for consumption in this country has declined while domestic production has increased steadily in recent years except for a decline in 1930.

V. V. Kelsey, Vice President and sales manager Consolidated Feldspar, who appeared for the importers, stated that American producers need no tariff protection because the costs of production in this country are lower than in Canada. The present duty of $1 per ton on crude feldspar he stated is working hardship on Canada, and is merely an added burden to the American consumer. Henry N. Hanna, Seaboard Feldspar, Baltimore, and Bruce Taylor, Genesee Feldspar Co., Rochester, N. Y., testified briefly for the importers. Mr. Hanna said that Canadian feldspar is offering no serious competition to the United States product, and he sees no reason for imposing a duty.

The American Mining Congress, at the request of a group of producers, requested an increase of 50 per cent. in the present duty of $1 per ton on crude.

Alcohol Regulations

Procedure relating to permit control of industrial alcohol and other nonbeverage liquors is outlined in a publication issued Sept. 24th, by James M. Doran, Commissioner of Industrial Alcohol in the



Commissioner James H. Doran outlines alcohol procedure

Treasury Department. Set forth in brief sequence are the varied steps of Government control over the issuance of permits and over all business transactions authorized by them.

Information is furnished for the guidance of more than 177,000 individuals, firms and corporations using industrial alcohol whose business operations are under Government supervision. It is also of interest to the general public because it shows what the Government does to protect the public's interest in controlling alcohol for lawful uses.

Latest figures show that 177,881 permits, in all classifications were in force at the close of the fiscal year ended June 30, 1931. This is an increase of 19,453 permits. The increase is largely due to the establishment of the new "T" permit class for professional groups. Copies of this booklet are obtainable from the Bureau of Industrial Alcohol in Washington.

Creosote Hearings

Tariff Commission announces the following dates for hearings in investigations instituted under the provisions of Section 332 of the Tariff Act of 1930: Copper October 28; crude petroleum, fuel oil, gasoline, and lubricating oils, October 29; dead or creosote oil, October 30.

The investigations with respect to copper and creosote oil were ordered by the Commission in accordance with Senate Resolutions numbered 434 and 470, respectively, both of the 71st Congress, and the petroleum investigation was ordered in accordance with House Resolution 391 of the same Congress.

Thirty members of the sales force of Grasselli attended the annual outing held at Forked River, N. J., recently with headquarters at Enos River Side Hotel.

Personnel

Four former employes of Atmospheric Nitrogen, an Allied Chemical subsidiary, sailed from New York Sept. 5 to teach workers to manufacture nitrates. The quartet are E. J. O'Brien, P. Y. Jones, G. W. Burt and H. E. Spencer.

Kalbfleisch announces that E. Y. Burckhalter has been appointed sales manager of the Rosin Size division. Mr. Burckhalter assumed his new duties on September 10. He has been with this organization for more than seven years, and recently has acted as Assistant Sales Manager of the Rosin Size division.

Victor M. O'Shaughnessy resigned as president American Solvents & Chemical

Victor M. O'Shaughnessy forsakes alcohol field

and of its subsidiary, Rossville Commercial Alcohol Corp. in August, but remains as a Director and will serve the Corporation in an advisory capacity according to an announcement made by American Solvents and released September 30. Mr. O'Shaughnessy is one of the best known men in the alcohol industry and pioneer in the development of the Rossville division.

H. I. Peffer, the Chairman of the Board, will consolidate the duties of President with his office.

Steik With Nat. Oil Products

Dr. Karl T. Steik, recently of the Standard Oil Development Co., has been appointed research director at the new main laboratories of National Oil Products at Harrison, N. J.

Dr. Steik needs but little introduction to the technical world. Graduating from Depew University, he continued his work at the University of Koenigsburg, Germany, being the recipient of medals in recognition of research work in the chemistry of oils. He holds a master's degree from Harvard University and a Ph. D. degree from the University of Chicago. Dr. Steik has been associate professor at the University of Wyoming

and University of Florida. Leaving the University he joined Sun Oil as research chemist and later Standard Oil of Indiana. Subsequently he became affiliated with Standard Oil Development at Elizabeth, N. J. Dr. Steik has long been associated with the oil industry and his talents are well-known. His appointment as research director of the National Oil Product's laboratories is in keeping with their ever widening research program.

Pressed Steel Tank Co., Milwaukee manufacturers of Hackney steel barrels, drums, tanks and cylinders, has announced the appointment of K. W. Cole as manager for its Chicago office.

Personal

William T. Daugherty, U. S. Trade Commissioner, Berlin, in a talk at a

William T. Daugherty on tour in the United States

meeting of the Synthetic Organic Chemical Manufacturers' Association, held in the Princeton Club, September 17, spoke on the Chemical Situation in Germany.

Grasselli Medalist

Grasselli Medal will be presented to Dr. L. V. Redman at a joint meeting of the Society of Chemical Industry with the New York Section of the American Chemical Society, American Electro chemical Society and Societe de Chimie Industrielle Nov. 6. The award has been made for his paper entitled, "Cost of Research and its Apportionment", presented at a meeting of these societies on December 9, 1927.

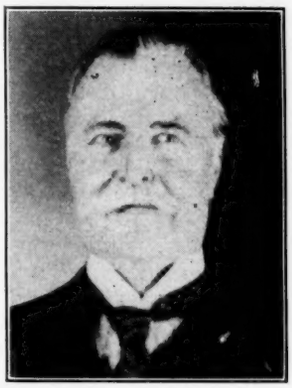
Chemical Foundation Gift

With the appropriation by the State Legislature of $20,000 a year for two years for maintenance purposes, Georgia accepted the opportunity offered by the Chemical Foundation, to erect within its borders a $50,000 experimental research plant for paper manufacture. The object of the plant is to demonstrate the commercial suitability of slash and other pines for news print and other paper stock.

Obituaries

C. Harold Smith

C. Harold Smith, often called the "Carbon King" and nationally famous for his contest to decide the best medium for disposing of his riches died Aug. 31 in



London without making any provisions in his will for distributing his wealth to charity.

Mr. Smith, founder of Binney & Smith, and vice-president Columbia Carbon, was a director in many other firms and a member of many clubs here. He was in England on a business trip. He was seventy-one years old.

The winner of the contest held before the stock market crash was Dr. Henry E. Garrett, Professor of Psychology at Columbia. Dr. Garrett's suggestion was that Mr. Smith establish an institute for mental hygiene where patients might come for advice and where juvenile crime and delinquents could be studied scientifically. He suggested that it be called the C. Harold Smith Institute for Mental Hygiene.

To judge the merits of the various suggestions offered by thousands of contestants, Mr. Smith appointed a committee headed by Mrs. Franklin D. Roosevelt. The other members of the committee were Dr. S. Parkes Cadman, Frederick Coudert Jr., Theodore Dreiser, Emory R. Buckner and Dr. Alfred Adler, the Viennese psychiatrist.

It is thought that the large decline (75%) in the common stocks held by Mr. Smith influenced him in his decision not to carry out the Garrett suggestions.

Frank R. Corwin

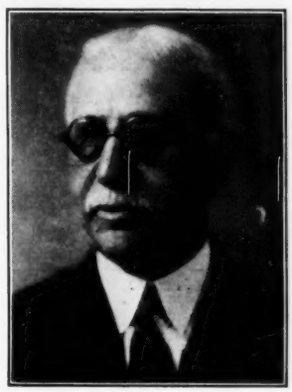
Frank R. Corwin, vice-president in charge of production, Nichols Copper, died Sept. 15. A graduate of the engineering school of the University of Michigan, class of 1909, he was successively associated with Anaconda, the Copper Queen Mining, and Southwest Metal, after which he joined Union Metals and constructed a smelter for it at Carteret, N. J. Following a number of years with American Smelting at Baltimore, he joined Nichols Copper in charge of production in New York and at Montreal.

Bernard Drakenfeld, Jr., president B. F. Drekenfeld & Co., Inc., died September 4. He was fifty-three years old. After a thorough training in several technical schools in Germany, Mr. Drakenfeld in 1898 joined the company founded by his father. In 1913, following the death of his father, he became the directing head of the company.

Henry W. Huning

Henry W. Huning starting with Mallinckrodt, when that organization included only four persons, and remaining with it until today when it employs hundreds of workers, completed in April of this year his sixty-third year of continuous service with the company.

Mr. Huning began his career when he was 16 years of age—April, 1868. At that time he worked as a "general handy man" in the production and packing departments. This was six months after the founding of the company in October, 1867.



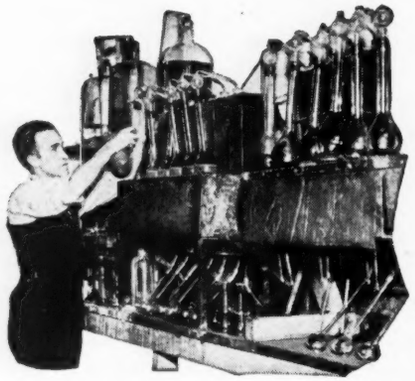
From almost the very start of his career Mr. Huning has been closely associated with the executive management of Mallinckrodt and has contributed in large measure to its success.

In 1876—eight years after he had become associated with it—Mr. Huning was given charge of the purchases and sales under the direction of the late Edward Mallinckrodt. He held this position until 1905 when the growth of the business made necessary the separation of the two departments. Since then he has devoted his entire time to sales. He was elected to his present position as a vice-president of the company in 1922.

Thurston Dissoway, owner Eckford Chemical, was drowned September 5 in Lake George, N. Y. He was fifty-three years old. For a number of years, prior to acquiring the Eckford concern, he was associated with E. R. Squibb & Sons.

Robert J. Moore, manager Varnish Resin Development Department, Bakelite, addressed the Niagara Rotary Club luncheon meeting at Niagara Falls, N. Y. recently. His subject was "New Developments in Protective Coatings".

• DIVISION OF U. S. INDUSTRIAL ALCOHOL CO. •



ETHYL ACETO-ACETATE

(*Acet-Acetic Ester*)

$CH_3CO.CH_2CO_2C_2H_5$

SPECIFICATIONS

Color & Properties:
Liquid—Approaching water-white in color

Constants:
Ester: 95% or over
Specific Gravity: 1.027 at 20°-20°C.
Wt. per Gal.: 8.55 pounds
Acidity: not over 0.5% as acetic acid

Solubility:
Miscible in all proportions with alcohol, ether, ethyl acetate, and other common organic solvents

Derivation:
Condensation reaction between two mols of ethyl acetate with elimination of one mol of alcohol

Method of Purification:
Distillation under vacuum

Grades:
Technical—95% or over

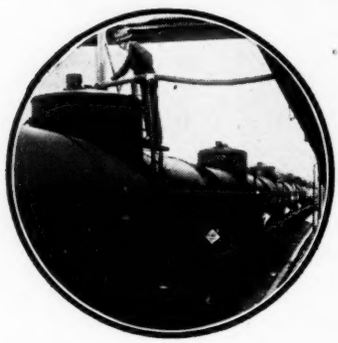
Containers:
Tin-lined drums
Carboys and bottles

Fire Hazard:
Combustible, but not inflammable. Flash point above 80° F.

Railroad Shipping Regulations:
None

Air view of Baltimore chemical plant showing water and rail facilities.

Continuous Ethyl Acetate unit. The largest of its kind.



Bulk shipments are made in the 400 company-owned tank cars.

THE properties of ethyl aceto-acetate define it as an unusual chemical due to its structure which permits great latitude in reactions. This latter quality proves of greatest value in the preparation of dyestuff and pharmaceutical intermediates. It is also well suited for organic synthesis, and in the preparation of many organic solids, antipyrine, ionone and other synthetic perfume bases.

It is made by treating pure ethyl acetate with metallic sodium in specially designed equipment followed by stages of isolation and distillation.

The U. S. I. C. is the largest producer of ethyl aceto-acetate. Because of rigidly enforced manufacturing standards which assure purity and uniformity, this product is superior to any on the market.

U. S. Industrial Chemical Co., Inc., 60 East 42nd Street, New York, N. Y. Branches in all principal cities.

U.S. INDUSTRIAL CHEMICAL CO., INC.

WORLD'S OLDEST AND LARGEST MANUFACTURER OF ALCOHOL CHEMICALS

Ethyl Phthalate. Butyl Phthalate. Nitrocellulose Solutions.

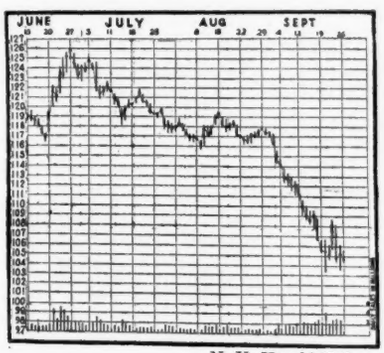
Amyl Acetate. Butyl Acetate. Ethyl Acetate. Ethyl Chloro Carbonate. Ether.

• DIVISION OF U. S. INDUSTRIAL ALCOHOL CO. •

The Financial Markets

Stock Market Values Fall to Record Lows—P & G Plans to Redeem Preferred Stock—Newport Industries Listed—Aluminum Ltd. Postpones Subscription Period—Imperial Chemical Declares Interim Dividend

The stock market in September brought on a fresh wave of liquidation. The loss in 240 issues as tabulated by the *New York Times* amounted to $7,188,722,493, the greatest since October, 1929. The market on Sept. 30 was down to 1924 levels.



N. Y. Herald Tribune

The close of each of the four weeks found stocks at new low levels. Only very feeble attempts were made to steady the market in the face of England's retreat from the gold standard and domestic news of an unfavorable nature. Very early in the month stock prices declined below the record lows made in the first week in June and the last two weeks found considerable banking support and stringent measures to prevent short selling unavailing in their efforts to prevent values from shrinking at an alarming rate.

August Gains Lost

The moderate gains made in August were more than offset in the losses sustained in chemical stocks in September. Every stock in the list in the box registered a loss and comparison of the two months is as follows:

	August	*September*
Allied Chemical	+5½	—18¼
Air Reduction	+5	— 7¼
Anaconda	.....	.....
Columbian Carbon	+ ⅜	— 7⅛
Com. Solvents	+ ⅞	— 8¾
du Pont	— ¾	— 4¾
Standard N. J.	+3½	—14
Texas Gulf	+2½	— 6¾
U. S. I.	+6⅝	— 5½

The individual losses in the Chemical group were as follows:

Allied Chemical & Dye	$70,237,674
Commercial Solvents Corp.	17,077,885
Davison Chemical Co.	3,150,419
Du Pont de Nemours & Co.	289,090,550
Mathieson Alkali Works	4,715,371
Texas Gulf Sulphur	33,660,300
Union Carbide & Carbon	162,527,210
U. S. Industrial Alcohol	3,084,213
Virginia-Carolina Chemical	180,253
Total	$583,723,875

Values Two Years Ago

September 19 witnessed the second anniversary of the date which is generally thought of as the turning point in the bull market, when prices reached their highest levels. A comparison of a number of stock prices on that date and Sept. 19, 1931 reflect the amount of value that has been swept aside during this period. It is rather difficult not to believe that present prices are at the very lowest and that the future trend will be in the direction of gradual recovery despite the fact that similar statements have been repeatedly made only to be shortly disproven.

	High 1929	*Close Sat., Sept. 19 1931*
Air Reduction	223⅜	69⅝
Allied Chem. & Dye	354¾	92
Amer. Smelt & Ref. new	130¼	22½
Anaconda Copper new	140	17¼
Columbian Carbon	344	51
Du Pont new	231	69⅝
Eastman Kodak	264¾	116
Johns-Manville	242¾	40⅞
Union Carb. & Carb. new	140	42
Vanadium Corp.	116½	19¾

Aside from the adverse foreign news the large part of the wave of liquidation in September was brought about by dividend actions. In the chemical and allied lines the omission by Anaconda, while not unexpected, had a very detrimental effect on the entire list. Dividends were passed by 154 companies and reduced by 114 more. The statistics for September compare with other months in this year as follows:

1931	*Omitted*	*Reduced*	*Increased*	*Initial*	*Resumed*
January	113	51	16	25	3
February	99	66	15	12	6
March	140	117	19	23	7
April	107	71	51	11	1
May	84	98	38	11	4
June	184	151	13	23	7
July	132	86	4	21	10
August	63	54	4	14	1
September	154	114	7	16	9
Total	1,076	778	167	156	48
Sept., 1930	96	66	13	24	1

Chemical Losses Severe

The losses sustained in the chemical group were only greater in three other industries, public utilities, oils and railroads and this despite the fact that in the chemical group only nine companies are included as against 29 public utilities, 25 railroads and 22 oil stocks. From these statistics compiled by the *New York Times* it is quite evident that chemical stocks were special targets in the decline.

Group changes in value for September compared with a year ago follow:

	1931	*1930*
Amusements	—$115,507,019	—$129,921,224
Building	— 107,113,220	— 123,922,384
Business equip.	— 78,996,177	— 41,162,519
Chain stores	— 310,110,084	— 76,096,641
Chemicals	— 583,723,875	— 408,653,181
Coppers	— 213,224,503	— 307,764,257
Dept. stores	— 58,144,295	— 29,294,424
Foods	— 476,133,438	— 250,844,756
Leathers	— 1,258,711	— 405,151
Mail order	— 151,010,513	— 109,902,858
Motors	— 687,646,487	— 417,009,485
Motor equip.	— 27,528,482	— 26,467,699
Otis	— 905,772,511	— 787,845,248
Public util.	—2,232,737,246	— 998,611,613
Railroads	— 690,575,186	— 482,464,964
Railroad equip.	— 62,647,221	— 58,507,280
Rubber	— 18,027,132	— 24,121,464
Steels	— 241,483,581	— 195,379,839
Sugars	— 19,244,134	— 13,069,759
Tobaccos	— 207,838,678	— 113,041,862

Promising Outlet

Without attempting to minimize the extent of the stock market decline in September it appears, at least from a pole of a large number of members of the chemical industry, that earnings for the third quarter would show up quite as favorably as either of the previous two and that the last quarter would show considerable improvement for the entire year. In most quarters the opinion was expressed that with the worst out of the way in both foreign and domestic news,

Price Trend of Chemical Company Stocks

Name	*Aug. 28*	*Sept. 4*	*Sept. 11*	*Sept. 18*	*Sept. 25*	*Net Change*
Allied Chem.	112	108¼	104¼	94¼	90	—18¼
Air Reduction	79	74¾	76	70¼	67½	— 7¼
Anaconda	24⅞	23¼	20⅞	17¼	16⅛	— 7⅛
Columbian Carbon	67	56½	56¾	52¾	47¾	— 8¾
Comm. Solvents	17⅛	16⅛	15¼	13⅛	11⅜	— 4¾
Du Pont	86¼	82½	76⅞	70⅛	68½	—14
Standard of N. J.	40¾	38⅝	36½	33⅝	32¼	— 6¾
Texas Gulf	35⅝	33⅛	32	29½	26⅜	— 6¾
U. S. I.	34½	32¼	32¾	30	26¾	— 5½

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definite signs of recovery would appear to change the tenor of the present state of uncertainty and apprehension.

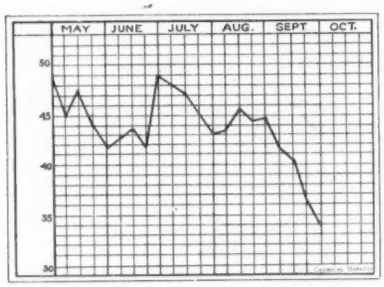
Over the Counter Prices*

	Bid	Asked
Am. Hard Rubber	...	24
J. T. Baker Chem.	12	18
Dixon Crucible	10	14
Dry-Ice	100	110
Merck pf.	..	30
Merck pt.	65	70
Solid Carbonic	4	7
Tubize B	37	42
Worcester Salt	84	89

*Sept. 30
†Dividend.

Average Price at New Low

Chemical stocks were carried along in the wave of selling, registering a new low for the CHEMICAL MARKETS Average Price



for 20 representative common stocks. The price stood at 44.60 on Aug. 28; 41.66, on Sept. 5; 40.24, on Sept. 12; 36.26 on Sept. 19; and 33.91 on Sept. 26, a net loss of 10.61 points. The previous record low was 40.27 at the beginning of June.

P. & G. Calls Meeting

P. & G. stockholders, annual meeting of October 14, will be asked to amend articles of the company so as to abolish the series of June 1, 1930, preferred stock, and to change the shares of that series into shares of the series of February 1, 1929, on a share-for-share basis.

Both series are part of an authorized issue of 457,500 preferred shares, and have the same rights as to dividend, redemption and liquidation provisions. The first or series of February 1, 1929, of which there are 125,000 shares, is listed on the New York Stock Exchange. The June 1, 1930, series, of which 125,000 shares are authorized and of which 46,569 shares are outstanding, is not listed on the New York Stock Exchange because of insufficient distribution. If the plan is approved, application will be made to list the 46,569 shares when converted into the 1929 issue.

Special meeting of Celotex stockholders has been called for October 21 to vote on reduction in stated book value of no-par common stock to $5 a share from $26.51 a share, or to $1,382,550 from $7,321,551 at which the 276,510 shares of no-par common were carried on October 31, 1930. On the latter date there were also outstanding 53,266 shares of $100 par value 7% cumulative preferred stock. Funded debt on October 31, 1930, totaled $2,569,800.

Dividends and Dates

	Div.	Stock of Record	Payable
Air Reduction ext.	$1.50	Sept. 30	Oct. 15
Air Reduction	.75	Sept. 30	Oct. 15
Dome Mines	.25	Sept. 30	Oct. 20
duPont, deb.	$1.50	Oct. 10	Oct. 24
Liquid Carbonic	.50	Oct. 20	Nov. 1
Newport Co. com*	$1.00	Sept. 28	Oct. 3
St. Joseph's Lead	.25	Dec. 10	Dec. 21
U. S. Smelting	.25	Oct. 1	Oct. 15
U. S. Smelting pf.	.87½	Oct. 1	Oct. 15
Vulcan Detinning	$1.00	Oct. 7	Oct. 20
Vulcan Detin'g pf.	$1.75	Oct. 7	Oct. 20

Annual and Special Meetings

	Books Close	Meeting Date
Celotex (special)	.....	Oct. 21
P & G	Sept. 23	Oct. 14
Va-Car	Sept. 15	Oct. 14

*One share Newport Industries for each share Newport common.

Newport Industries Listing

A new listing, Newport Industries, Inc., is asked of New York Stock Exchange, representing 601,877 shares of $1 par value stock. These shares are to be exchanged for shares of the Newport Co. This will effect a reorganization of the Newport company and will give stockholders a new equity in the remaining properties and in the 103,500 shares of du Pont debenture stock received for the properties sold.

The Phelps Dodge Corp. seeks to list 2,605,005 additional shares of common stock to complete the merger of that company with the Calumet & Arizona Mining Co.

At the annual meeting of the Vanadium Corp. all retiring directors were reelected.

There were 235,165 shares represented at the meeting. Stockholders in the corporation now total more than 4,000, the largest number on record.

Liquid Carbonic Corp. is likely to reduce current 75-cents quarterly dividend, according to Wall St. reports. While there is a probability that the cut will be as much as 25 cents, it is unlikely the rate will be lowered below 50 cents quarterly. Present indications are that the company for its fiscal year ended September 30, next, will show net of around $2.75 a share on its capital stock. This would compare with $2,011,087, or $5.22 a share, on 342,406 no-par shares in the previous year.

International Nickel declared a quarterly dividend of 10 cents on the common stock, payable September 3 to stock of record August 31. This places the stock on a 40 cents annual basis against 60 cents previously.

Congoleum-Nairn, declared a dividend of 25c on the common stock, payable September 15, to stock of record August 15. This marks a resumption of dividends, the last previous payments having been made in 1925. In that year $2.50 was disbursed.

Aluminum Ltd., Warrants

Aluminum Ltd., has made the following announcement of postponement of date of exercising its outstanding common share subscription warrants: "It has been decided that the time for exercising the B, C and D warrants will be extended in each case approximately three months. Final date on which B warrants may be exercised will be January 2, 1932, instead of October 1, 1931, final date on which C warrants may be exercised will be April 1, 1932, instead of January 2, 1932, and final date on which D warrants may be exercised will be July 2, 1932 instead of April 1, 1932."

Anaconda omitted the quarterly dividend of 37½ cents due at this time.

London—Imperial Chemical Industries, Ltd., has declared an interim dividend of 1½%, less tax, on common shares.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Chemical Markets, published monthly at Pittsfield, Mass., October 1, 1931.

State of New York, County of New York—ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Williams Haynes, who, having been duly sworn according to law, deposes and says that he is the Publisher of the Chemical Markets, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse sideof this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Williams Haynes, 25 Spruce St., New York, N. Y.; Editor, none; Managing Editor, W. J. Murphy, 25 Spruce St., New York, N. Y.; Business Manager, William F. George, 25 Spruce St., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Chemical Markets, Inc.; 25 Spruce St., New York, N. Y.; Williams Haynes, 25 Spruce St., New York, N. Y.; William F. George, 25 Spruce St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state). None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

Williams Haynes, Publisher.

Sworn to and subscribed before me this 15th day of September, 1931. J. Oscar Fischer, Notary Public, N. Y. Co. Clerk's No. 90 N. Y. Reg. No. 27-434 Comm. Expires, March 1932.)

Company Reports

International Earnings Reflect Agricultural Conditions

International Agricultural Corp. and affiliated companies for year ended June 30, 1931, shows net profit of $60,677 after interest, depreciation, depletion, etc., equal to 60 cents a share on 100,000 shares of 7% prior preference stock, on which there is an accumulation of unpaid dividends. This compares with $1,526,176 or $15.26 a share on prior preference stock in preceding fiscal year, and after allowing for only regular annual dividend requirements on prior preference stock, to $1.83 a share on 450,000 no-par shares of common stock.

Consolidated income account for year ended June 30, 1931, compares as follows:

	1931	*1930*	*1929*	*1928*
Gross profit	$2,850,125	$4,382,682	$3,711,480	$3,820,562
Expenses	1,897,492	1,836,925	1,775,8?5	1,668,154
Oper profit	$952,633	$2,545,757	$1,935,595	$2,152,408
Other inc	84,552	121,453	131,312	62,230
Total inc	$1,037,185	$2,667,210	$2,066,907	$2,214,638
Interest	448,498	469,713	492,304	445,816
Depr & depl	532,363	604,323	520,327	466,141
Profit	$56,324	$1,593,174	$1,054,276	$1,302,681
Prof bds prch	4,353	68,002	62,341	.....
Rec fr Ger debt	.....	.....	.....	143,924
Profit	$60,677	$1,661,176	$1,116,617	$1,446,605
Fed taxes	.....	135,000	.....	.....
Net profit	$60,677	$1,526,176	$1,116,617	$1,446,605
*Pr prf divs	525,000	525,000	700,000	175,000
Deficit	$464,323	†$1,001,176	†$416,617	†$1,271,605

*In 1931, 5¼%; 1930, 5¼%; 1929, 7%; 1928, 1¾%. †Surplus.

Archer-Daniels-Midland Co. and subsidiaries report for ten months ended June 30, 1931, net profit of $508,112 after depreciation, interest, federal taxes, etc., equivalent after preferred dividends paid to 56 cents a share on 549,546 shares of no-par common stock. In previous year company reported for year ended August 31, 1930, and showed net profit of $1,375,761, equal to $2.01 a share on common. Company has changed its fiscal year to end June 30, instead of August 31.

Consolidated balance sheet of Archer-Daniels-Midland Co. and subsidiaries as of June 30, 1931 compares as follows:

	June 30, '31	*Aug. 31, '30*	*Aug. 31, '29*	*Aug. 31, '28*
Assets				
*Land, bldgs, mach, etc	$18,944,676	$9,017,112	$8,617,970	$7,569,474
Goodwill, etc	1	1	1	1
Invest & adv affil co	40,676	86,518	148,688	168,800
Inventories	5,047,720	10,441,962	10,341,716	6,693,345
Notes rec, etc	163,712	44,440	36,186	34,096
Accts rec	1,213,814	1,390,980	2,702,661	2,344,488
U S govt duty drawback	149,213	78,745	.....	.....
Liberty bonds	.....	.....	20,000	20,000
Cash	2,884,584	1,438,388	954,423	1,337,589
Other assets	760,677	392,589	121,285	59,052
Grain adv	.....	.....	651,757	354,397
Advances	335,686	669,206	.....	125,000
Def. chgs	64,876	93,334	148,362	60,111
Total	$19,605,635	$23,653,275	$23,743,049	$18,766,353
Liabilities				
Pfd stock	$3,361,300	$3,800,000	$3,800,000	$4,300,000
Com stock	†9,736,999	†9,736,999	8,350,266	5,812,436
Accts payable	444,899	825,518	539,810	269,798
Drafts payable	195,857	.....	.....	.....
Notes payable	.....	3,017,557	3,372,500	.....
Accrued exp	93,409	89,670	.....	.....
Advances	.....	.....	29,850	70,421
Fed tax res	50,000	261,644	‡532,330	‡577,508
Cntg res	§166,855	132,803	.....	.....
Def income	8,166	.....	.....	.....
Due off & emp	.....	.....	1,372,761	1,065,589
Surplus	5,548,150	5,789,084	5,745,532	6,670,601
Total	$19,605,635	$23,653,275	$23,743,049	$18,766,353

*After depreciation. †Represented by 549,546 no-par shares. ‡Includes contingent reserve. §Not current.

Callahan Zinc-Lead Co. reports for quarter ended June 30, 1931, loss of $16,348 after development costs, expenses etc., but before depreciation and depletion, comparing with loss of $13,700 in preceding quarter and loss of $18,360 in June quarter of previous year.

For six months ended June 30, 1931, loss amounted to $30,048 after costs and expenses against loss of $24,003 in first half of 1930.

Newport Industries, Inc., Statement

Statement of the wood distillate division of the Newport Co. to be transferred to Newport Industries, Inc., for seven months ended July 31, 1931 (without allowing for income from 6% non-voting debenture stock of E. I. du Pont de Nemours & Co. to be transferred to it by Newport Co., or for deduction of proportion of federal taxes) shows loss of $222,080 after expenses and depreciation.

Pro-forma consolidated balance sheet of Newport Industries, Inc. and subsidiaries, showing as at July 31, 1931, the assets of the wood distillate division of the Newport Co. and other assets to be acquired from that company, and the liabilities of the Newport Co. to be assumed, by Newport Industries, Inc., such acquisition and assumption to be effective upon the issuance on or before October 3, 1931 of shares of the capital stock of Newport Industries, Inc., follows:

Assets: Land, buildings and machinery, after depreciation, $2,281,628; patents and trade-marks, $13,303; cash, $297,410; marketable securities, represented by 11,145 shares E. I. du Pont de Nemours & Co. 6% non-voting debenture stock, $1,337,430; accounts receivable $313,591; inventories, $785,343; investment in affiliated company, etc., $672,066; advances to affiliated company, $105,583; deferred charges $62,429. Total, $5,868,773.

Liabilities: Capital stock, par $1, $521,215; accounts payable, $152,101; accrued liabilities, $60,000; provision for federal taxes, $155,071; purchase money obligation in connection with the acquisition of preferred stock of subsidiary company, $260,500; reserve for taxes, $605,569; contingent reserve, $242,000; miscellaneous reserves, $25,641; paid-in surplus, $3,846,670. Total, $5,868,773.

McK & R Earnings Favorable

McKesson & Robbins, Inc., and subsidiaries reports consolidated income account for six months ended June 30, 1931, compares as follows:

	1931	*1930*
Net sales	$60,996,637	$67,419,293
Costs and expenses	58,948,622	65,312,451
Depreciation	323,360	330,844
Profit on sales	$1,724,655	$1,775,998
Other income	554,979	565,377
Total income	$2,279,634	$2,341,375
Minority interest	44,858	48,599
Other charges	109,859	99,707
Interest	706,092	*783,953
Other charges	109,859	99,707
Interest	706,092	*783,953
Federal taxes, etc	118,445	.....
Net profit	$1,300,380	$1,409,116

*Includes federal taxes.

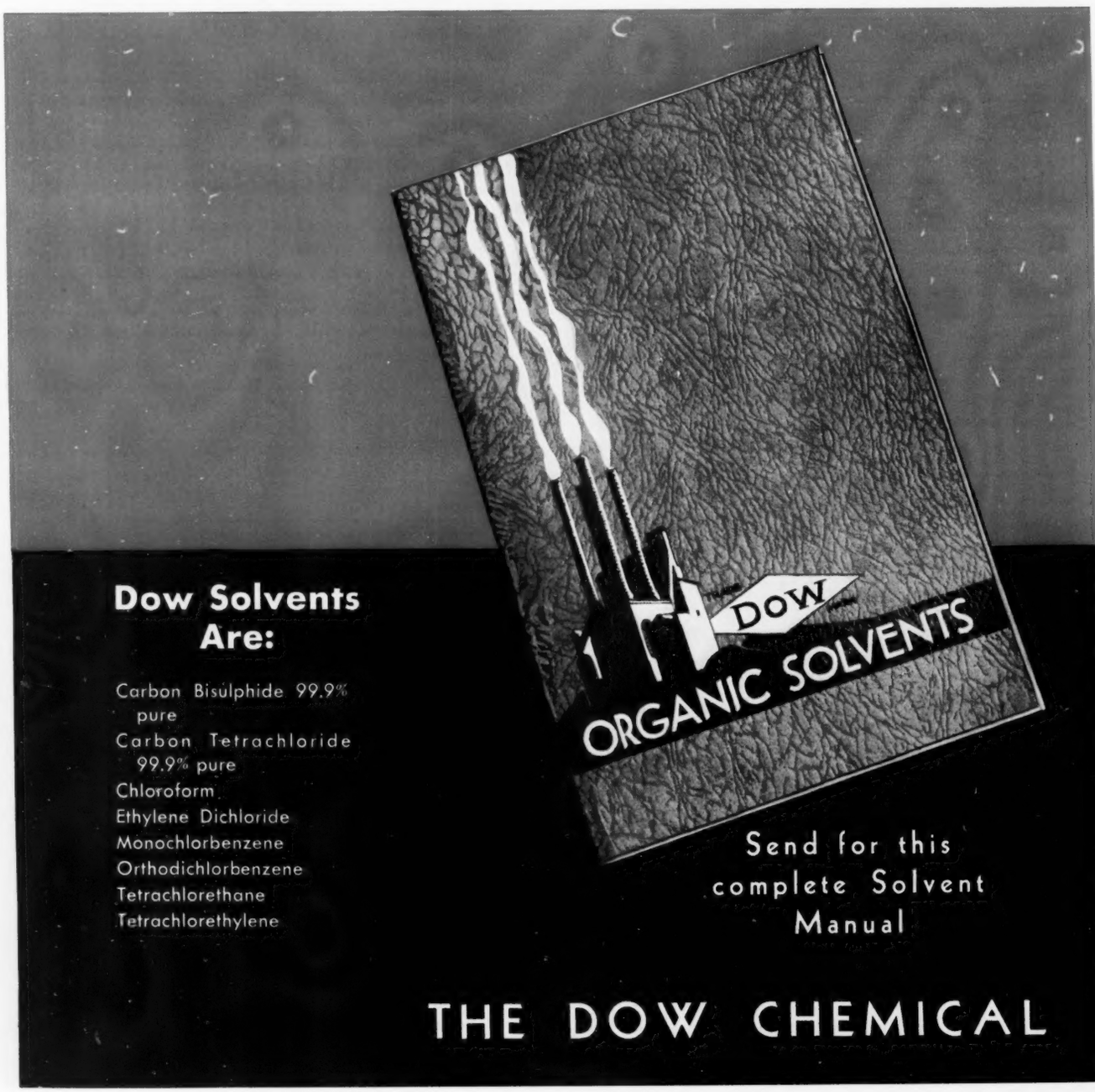
Standard Wholesale Phosphate & Acid Works, Inc., for the first quarter of the fiscal year starting June 1 and ended August 31 show a net profit after deducting fixed charges of $60,236.

Earnings at a Glance

Company	*Annual Dividends*	*Net Income 1931*	*Net Income 1930*	*Common Share Earnings 1931*	*Common Share Earnings 1930*
Archer-Daniels-Midland Co.: 10 mos., June 30	f...	508,112	*.....	.56	...
International Agricultural: Year, June 30	f...	60,677	1,526,176	s.60	1.83
Industrial Rayon Corp.: 2 mos., Aug. 31	4.00	202,934	*.....	1.40	...
United Dyewood Corp.: 6 mos., June 30	f...	86,564	142,261	p2.00	.02

*Not available. †Net loss. ‡Profit before federal taxes. dDeficit. fNo common dividend. pOn preferred stock.

DOW ORGANIC

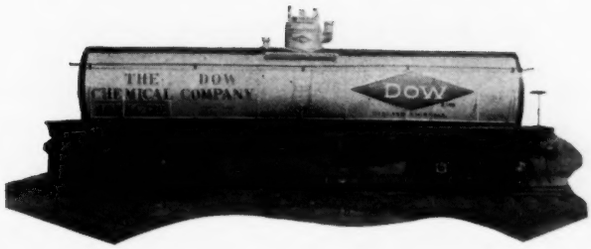


Dow Solvents Are:

Carbon Bisulphide 99.9% pure
Carbon Tetrachloride 99.9% pure
Chloroform
Ethylene Dichloride
Monochlorbenzene
Orthodichlorbenzene
Tetrachlorethane
Tetrachlorethylene

Send for this complete Solvent Manual

THE DOW CHEMICAL

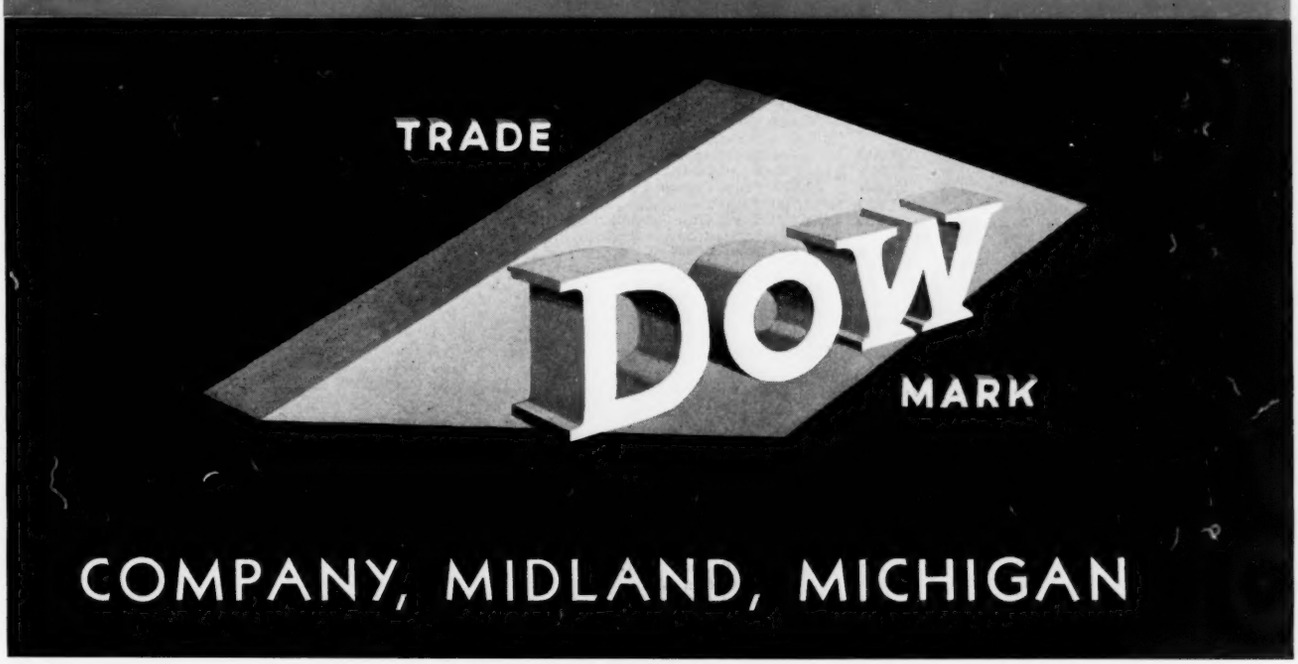


SOLVENTS

DEVELOPMENTS by The Dow Chemical Company have opened up a new field of solvent usefulness. Long experience with solvents and solvent uses has resulted in the commercial manufacture of eight liquid solvents for wide use in general industry. Four of these are non-inflammable. The physical properties cover a sufficiently wide range to recommend the use of at least one of them for practically any extraction problem.

Some of these solvents are used to provide fluidity in hard-to-handle materials. Others serve as carriers only to retain plastic or spreading qualities; or as extraction media for oils, gums, resins and other substances. Some are useful as cleansing agents, because of their faculties of dissolving and removing foreign substances without injury to the product itself.

Send for the complete solvent manual illustrated opposite. No obligation.



The Industry's Stocks

1931 High	1931 Sept. Low	1931 Sept. Last	1931 High	1931 Low	1930 High	1930 Low	Sales In Sept.	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
									NEW YORK STOCK EXCHANGE					
79⅞	57¼	58¼	109⅜	57¼	156¾	87½	139,300	1,247,700	Air Reduction	No	830,000	$3.00	6.32	7.75
114	82	82	182¼	82	343	170½	303,000	2,181,085	Allied Chem. & Dye	No	2,401,000	6.00	9.77	12.60
123½	120½	120½	133¼	120½	126½	120½	3,200	13,300	7% cum. pfd.	100	393,000	7.00		76.88
13⅛	7	7	29⅜	7	10⅜	1⅜	12,800	61,500	Amer. Agric. Chem.	100	333,000		Yr. Je. '30 Nil	
8½	5⅜	5⅜	14½	5⅜	33	9	19,900	201,500	Amer. Com. Alc.	No	389,000		d1.27	3.22
11	6¾	7	23¾	6¾	51½	7	40,100	131,000	Amer. Metal Co., Ltd.	No	1,218,000	1.00	1.63	3.23
51	41	41	89½	41	116	80	110	1,400	conv. 6% cum. pfd.	100	68,000	6.00		47.53
31½	19¾	22⅞	58½	19⅞	79½	37½	130,850	863,745	Amer. Smelt. & Refin.	No	1,830,000	4.00	3.77	10.02
123½	99½	99½	138½	99½	141	131	3,600	15,500	7% cum. pfd.	100	500,000	7.00		43.66
			4½		22½	2	62,000	116,300	Amer. Solvents & Chem.	No	503,000		d2.86	2.56
5	3	3⅜	8¼	3	17⅞	3⅜	9,300	35,200	Amer. Zinc. Lead, & Smelt.	25	200,000		d1.46	0.53
38½	30	...	45⅛	26¼	79⅛	26¼	400	13,500	6% cum. pfd.	25	80,000			7.32
25	15	15	43¼	15	81½	25	614,978	4,621,903	Anaconda Copper Mining	50	8,859,000	2.50	e2.07	8.29
10½	9	9	18	8	29¼	13½	7,200	96,700	Archer Dan. Midland	No	550,000	2.00	Yr. Aug. '30 1.68	
17	10⅜	10⅜	23⅜	10⅜	51⅛	16⅛	82,375	747,575	Atlantic Refining Co.	25	2,690,000	1.00	1.02	6.20
37	24⅞	24⅞	54	24⅞	106	42	3,900	33,500	Atlas Powder Co.	No	265,000	4.00	2.67	7.66
85	82½	82½	99⅞	82½	106	97	290	3,640	6% cum. pfd.	100	96,000	6.00		28.25
1			2		5½		4,600	22,200	Butte & Sup. Mining	10	290,000			Nil
1¼	1½	1¼	2¾	1⅛	4¼	1½	4,900	34,300	Butte Copper & Zinc	5	600,000		Nil	0.34
5	3	3	7½	2½	15⅛	2	5,300	75,700	Certain-Teed Products	No	400,000		d7.61	Nil
...	...	...	25½	8½	45⅛	6¾		4,410	7% cum. pfd.	100	63,000			Nil
43⅜	28	30	50½	28	64⅛	44	34,100	104,600	Colgate-Palmolive-Peet	No	2,000,000	2.50	3.76	4.03
67	40	40	111⅝	40	199	65½	129,000	627,520	Columbian Carbon	No	499,000	5.00	5.04	7.84
17½	9⅞	10½	21½	9⅞	38	14	290,000	2,239,190	Comm. Solvents	No	2,530,000	1.00	1.07	1.51
66⅜	41½	42	86⅝	41½	111⅜	65	148,000	686,500	Corn Products	25	2,530,000	3.00	4.82	5.49
150⅜	140⅛	140⅛	152⅛	140⅛	151⅛	140	840	6,870	7% cum. pfd.	100	250,000	7.00		62.59
11	4½	4½	23	4½	43⅛	10	28,700	300,800	Davison Chem. Co.	No	504,000		Yr. Je. '30 4.00	
14	12	12½	19½	11	42½	11½	1,700	22,700	Devoe & Raynolds "A"	No	160,000	1.20	2.24	4.52
101	96	101	109	100	114½	99	70	680	7% cum. 1st pfd.	100	16,000	7.00		67.59
86½	59½	59⅜	107	59½	145½	80½	782,400	3,747,000	DuPont de Nemours	20	11,014,000	4.00	4.52	6.99
124⅛	116⅛	116⅛	124⅜	116⅛	123	114½	6,600	28,420	6% cum. deb.	100	978,000	6.00		78.54
144⅛	98⅛	99½	185⅞	98⅛	255½	142½	273,000	1,318,369	Eastman Kodak	No	2,261,000	5.00	8.84	9.57
135	132½	135	135	126	134	120⅜	280	1,580	6% cum. pfd.	100	62,000	6.00		356.89
27	17	17½	43⅛	17	55½	24½	70,700	760,300	Freeport Texas Co.	No	730,000	4.00	w4.77	5.60
22½	9⅜	10½	47	9⅜	71⅛	22⅜	76,400	583,000	General Asphalt Co.	No	413,000	3.00	2.44	4.71
10⅛	5⅛	5½	16⅛	5⅛	38	7	19,900	191,171	Glidden Co.	No	695,000		Yr. Oct. '30 Nil	
80	73½	73½	80	60	105¼	63½	740	7,680	7% cum. prior pref.	100	74,000	7.00	Yr. Oct. '30 Nil	
42	37	37	58	37	85	50	3,200	11,500	Hercules Powder Co.	No	603,000	3.00	2.61	5.95
116	112	112	119½	111	123¾	116½	890	3,950	7% cum. pfd.	100	114,000	7.00		38.16
34⅛	22½	22⅜	86	21½	124	31	21,600	342,000	Industrial Rayon	No	200,000	4.00	7.74	7.26
1⅞	1½	1½	5⅛	1⅜	8⅛	3⅜	4,200	37,800	Intern. Agric.	No	450,000		Yr. Je. '30 1.68	
12	10¼	10¼	51¼	10¼	67½	42½	1,100	14,800	7% cum. prior pfd.	100	100,000	7.00	Yr. Je. '30 14.58	
13⅛	8	8	20⅛	8	44⅜	12⅜	663,500	5,163,300	Intern. Nickel	No	14,584,000	1.00	.67	1 47
34	27	27	42	27	45⅜	31	20,600	366,600	Intern. Salt	No	240,000	3.00		11.32
52½	37	37	80⅛	37	148⅜	48⅜	196,800	2,572,500	Johns-Manville Corp.	No	750,000	3.00	3.66	8.09
13⅜	9	10	16⅜	9	25	8⅜	1,300	12,800	Kellogg (Spencer)	No	598,000	0.80	h1.14	2.36
24	16¼	17	55⅛	16¼	81⅞	39	25,100	219,900	Liquid Carbonic Corp.	No	342,000	4.00	Yr. Sep. '30 5.22	
10½	7⅛	8	17	7⅛	37⅜	10⅛	24,000	305,100	McKesson & Robbins	No	1,073,000	1.00	.96	2.65
31½	26½	26½	37⅜	20	49½	25⅜	1,800	38,200	conv. 7% cum. pref.	50	428,180	3.50		9.43
19½	15½	16	25	15½	39⅜	20	2,100	13,100	MacAndrews & Forbes	No	340,000	2.60	2.61	3.13
23½	15½	15⅜	31½	15½	51⅜	30½	22,700	393,165	Mathieson Alkali	No	650,000	2.00	2.96	3.31
120	110	110	...	...	136	115	200	750	7% cum. pfd.	100	28,000	7.00		93.91
28	16¼	18	29	16¼	63¾	18⅜	12,900	61,000	Monsanto Chem.	No	416,000	1.25	1.71	4.25
28	21⅜	22	36⅜	19¼	39½	18⅛	25,200	317,900	National Dist. Prod.	No	252,000	2.00	1.23	1.42
103⅜	85	85	132	85	189½	114	5,700	71,900	National Lead	100	310,000	5.00	7.58	25.49
142	140	140	143	135⅜	144	135	1,860	6,230	7% cum. "A" pfd.	100	244,000	7.00		41.95
118	118	118	120	118	120	116	150	4,280	6% cum. "B" pfd.	100	103,000	6.00		82.47
55⅛	54¼	55	55⅛	41	85	30	3,900	10,500	Newport $3 cum. conv. "A"	50	33,000	3.00	z5.94	29.79
37¼	22⅜	23	46½	22⅜	55⅜	26⅛	32,500	303,100	Penick & Ford	No	425,000	1.00	4.01	3.97
65⅜	40	40⅛	71⅛	40	78⅜	52⅜	138,400	325,000	Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30 3.36	
9	5⅛	5⅜	11⅞	5⅛	27½	7⅛	55,900	442,200	Pure Oil Co.	25	3,038,000		.18	1.52
85⅞	70⅛	73⅛	101⅞	67	114½	90⅛	660	8,700	8% cum. pfd.	100	130,000	8.00		22.55
24¼	13½	17⅜	42⅜	13½	56½	36¼	48,100	339,600	Royal Dutch, N. Y. shs.		894,000		2.39	3.35
15⅛	10	10	30⅜	10	57½	19½	22,400	326,900	St. Joseph Lead	10	1,951,000	2.00	2.09	3.82
6¼	3⅜	3⅜	10½	3⅜	25⅜	5½	97,000	783,490	Shell Union Oil	No	13,071,000		d.56	1.26
41¼	30	30	51⅜	30	75	42½	152,110	1,086,510	Standard Oil, Calif.	No	12,846,000	2.50	2.88	3.63
41¼	29⅜	29⅜	52½	29⅜	84⅞	43½	386,000	3,423,425	Standard Oil, N. J.	25	25,419,000	1.00	1.65	4.76
19⅜	13¼	13½	26	13¼	40⅜	19¾	327,300	2,167,355	Standard Oil, N. Y.*	25	17,809,000	1.60	.92	2.23
5¼	2¼	2¼	9½	2¼	17	7¼	19,700	72,800	Tenn. Corporation	No	857,000	1.00	1.21	2.19
27	16½	16½	36¼	16½	60½	28¼	217,200	1,623,100	Texas Corp.	25	9,851,000	3.00	1.53	4.91
35⅞	21½	21½	55½	21½	67⅜	40½	123,600	1,553,800	Texas Gulf Sulphur	No	2,540,000	4.00	5.50	6.40
51½	32⅝	32⅞	72	32⅝	106⅜	52⅜	508,700	3,461,775	Union Carbide & Carb.	No	9,001,000	2.60	3.12	3.94
15	7⅜	7⅜	28⅜	7⅜	84	14⅜	28,100	444,500	United Carbon Co.	No	398,000		1.43	1.94
34¼	24¼	24¼	77⅜	24½	139⅜	50½	64,100	815,300	U. S. Ind. Alc. Co.	No	374,000	6.00	z2.96	12.63
29	16½	16½	76⅞	16½	143⅛	44⅜	192,850	7,664,150	Vanadium Corp. of Amer.	No	378,000	3.00	2.95	4.91
1⅜	1	1	3½	1	8⅞	1⅜	6,600	22,800	Virginia Caro. Chem.	No	487,000		Yr. Je. '30 Nil	
7⅞	5	5	17	5	34½	9	3,800	18,750	6% cum. part. pfd.	100	213,000		Yr. Je. '30 2.63	
57	50	50	72	50	82⅜	67½	2,200	8,500	7% cum. prior pfd.	100	145,000	7.00	Yr. Je. '30 11.96	
18	10¼	10¼	40	10¼	59½	18	47,200	119,050	Westvaco Chlorine Prod.	No		2 00	2.51	4.32

h 11 mos. ending Aug. 30
w 13 mos.
z Before inventory adjustment
* Socony Vacuum

									NEW YORK CURB					
10	8¼	8¼	8⅛	5	13	3⅜	1,100	5,500	Acetol Prod. conv. "A"	No	60,000			0.42
5⅜	4⅛	...	19½	4⅛	34	16	1,100	86,825	Agfa Ansco Corp.	No	300,000			Nil
130½	89	89	224	89	356	140½	37,700	177,518	Aluminum Amer.	No	1,473,000		z1.93	11.18
99	88	88	109⅜	88	111½	104	1,200	25,000	6% cum. pfd.	100	1,473,000	6.00		17.19
46	32	32	102	32	232	57½	1,300	13,500	Aluminum Ltd.	No	573,000			4.15
7⅜	3⅜	4¼	12¼	3⅜	37	6⅜	66,500	552,100	Amer. Cyanamid "B"	No	2,404,000			4.15
1	⅜	⅜	15	⅜	43⅜	7⅜	4,600	71,400	Anglo-Chilean Nitrate	No	1,757,000		Yr. Je. '30 Nil	
...	...	...	4	⅜	6½	⅜		21,706	Assoc. Rayon Corp.	No	1,200,000		Yr. Je. '30 1.87	
...	...	...	60	32¼	60⅜	31¼		47,300	conv. 6% cum. pfd.	100	200,000	6.00		

Methanol

(NATURAL)

All Grades Including
Pure Methanol
97% Methanol
95% Methanol
Denaturing Grade Methanol

●

Methyl Acetone

Shipments In
Tank Cars Drums

●

GENERAL OFFICE
212 TERMINAL BLDG. - BRADFORD, PA.

WOOD DISTILLERS CORPORATION

Refinery—
Cadosia, N. Y.

Sales Office & Warehouse
7-11 Getty Ave. - Paterson, N. J.

TELEPHONE SHERWOOD 2-5027

Ammonium Persulfate

Potassium Persulfate

JOSEPH TURNER & CO.

19 Cedar St. -:- **New York City**

1931 Sept. High	1931 Sept. Low	1931 Last	1931 High	1931 Low	1930 High	1930 Low	Sales In Sept.	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
⅞	⅞	⅞	1⅜	⅞	5½	1⅜	300	22,900	Brit. Celanese Am. Rcts.	2.43	2,806,000			0.03
75	64½	...	81¼	64½	90	48	300	2,750	7% cum. part. 1st pfd.	100	148,000	7.00		14.50
60	52	52	65	45½	90	70	850	4,585	7% cum. prior pfd.	100	115,000	7.00		25.70
...	...	...	...	...	20	3½		6,440	Celluloid Corp.	No	195,000			1.76
7¼	7¼	7¼	9	7¼	13¼	8¾	100	3,800	Courtaulds, Ltd.	1£				0.34
40	36¾	...	51	34	100	49	1,200	4,900	Dow Chemical	No	630,000	2.00	3.44	4.08
63	40¼	40¼	75½	38	166⅞	58½	50,200	250,100	Gulf Oil	25	4,525,000	1.50		9.83
9	8	8	13	8	23	10½	500	2,900	Heyden Chemical Corp.	10	150,000			3.08
...	...	...	3¼	3¼	7	4		2,300	Imperial Chem. Ind.	1£				0.49
...	...	...	...	...	16	3½		100	Monroe Chem.	No	126,000			2.54
41½	26	...	60	36	79½	45	900	6,900	Shawinigan W. & P.	No	2,178,000	2.50		2.35
60⅜	56	56½	66¼	56	85	58	550	7,600	Sherwin-Williams Co.	25	636,000	4.00	Yr. Aug. '30 4.14	
4½	2	2¼	12	2	34½	3¾	5,700	39,500	Silica Gel Corp.	No	600,000			
27⅛	19½	19⅝	38½	19½	59⅞	30	146,100	360,300	Standard Oil Ind.	25	16,851,000	2.50	2.73	4.66
26⅜	22½	23½	30⅜	22½	34½	27	16,700	69,400	Swift & Co.	25	6,000,000	2.00	2.08	2.18
5	3	3	16	3	22¾	3	8,900	150,550	Tubize "B"	No	600,000	10.00		
									United Chemicals					
15	15	15	28½	14	44	14	100	22,800	$3 cum. part. pfd.	No	115,000	3.00		7.66
									CLEVELAND					
...	...	...	94	76	96	91½			Cleve-Cliffs Iron ,$5 pfd.	No	498,000	5.00	11.42	
41⅞	36	39	51½	34½	100	48	596		Dow Chemical Co.	No	630,000	2.00	3.44	4.08
61	56¼	56½	68½	53¾	85	57½	2,874	17,757	Sherwin-Williams Co.	25	636,000	4.00	Yr. Aug. '30 4.14	
									CHICAGO					
37½	29	31⅜	39⅞	29	46¾	33½	2,300	11,050	Abbott Labs.	No	145,000	2.50	3.32	4.92
5	4¼	4½	5½	4	15	3½	710		Monroe Chem.	No	126,000		1.09	2.54
32	27	27	33	27	35	15½	350	2,100	$3.50 cum. pref.	No	30,000	3.50		13.35
26½	22⅜	23⅜	30½	22⅜	33¼	27	37,600	94,350	Swift & Co.	25	6,000,000	2.00	2.08	2.18
									CINCINNATI					
63½	47¼	48¼	71	47¼	110	53½	27,794	53,757	Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30 3.36	
									PHILADELPHIA					
60¼	56½	56½	71	56	100	89	400	2,800	Pennsylvania Salt	50	150,000	5.00	Yr. Je. '30 7.97	

The Industry's Bonds

1931 Sept. High	1931 Sept. Low	1931 Last	1931 High	1931 Low	1930 High	1930 Low	Sales In Sept.	Sales During 1931	ISSUE	Date Due	Int. %	Int. Period	Out-standing $
									NEW YORK STOCK EXCHANGE				
90½	85⅞	...	99	83¾	100½	93	33	257	Amer. Cyan. deb. 5s.	1942	5	A. O.	4,554,000
95½	84	84	102	84	177	94¾	546	3,990	Amer. I. G. Chem. conv. 5½s.	1949	5½	M. N.	29,933,000
103½	98½	100	104½	98½	104	101	268	3,372	Am. Smelt & Ref. 1st. 5s. "A"	1947	5	A. O.	36,578,000
54	40	...	63½	40	98½	67	67	711	Anglo-Chilean s. f. deb. 7s.	1945	7	M. N.	14,600,000
102½	99½	99½	103	99½	103	100	61	1,285	Atlantic Refin. deb. 5s.	1937	5	J. J.	14,000,000
...	...	...	104	97	105½	100½		573	Interlake Iron Corp. 1st 5½s "A"	1945	5½	M. N.	6,629,000
105	102	102	105⅛	102	104½	97½	21	137	Corn Prod. Refin. 1st s. f. 5s.	1934	5	M. N.	1,822,000
25	6	14½	75½	6	87½	38	418	4,688	Lautaro Nitrate conv. 6s.	1954	6	J. J.	32,000,000
89	75	80	96	75	100½	87	150	1,365	Pure Oil s. f. 5½% notes	1937	5½	F. A.	17,500,000
97	90	90	103	88	104	93¾	57	760	Solvay Am. Invest. 5% notes	1942	5	M. S.	15,000,000
105	101¾	103¾	105½	101¾	104¾	100	483	6,173	Standard Oil, N. J. deb. 5s.	1946	5	F. A.	120,000,000
101	98	100	106½	97¾	104½	96½	395	4,434	Standard Oil, N. Y. deb. 4½s.	1951	4½	J. D.	50,000,000
85½	60	60	99	60	102½	90½	10	1,445	Tenn. Corporation deb. 6s. "B"	1944	6	M. S.	3,308,000
									NEW YORK CURB				
104½	100½	100½	105½	100½	104½	100½	190,000	1,892,000	Aluminum Co., s. f. deb. 5s.	1952	5	M. S.	37,115,000
94	87	88½	104½	87	104½	96½	55,000	1,003,000	Aluminum Ltd., 5s.	1948	5	J. J.	20,000,000
20½	20	...	56	20	60	51	5,000	41,000	Amer. Solv. & Chem. 6½s.	1936	6½	M. S.	1,737,000
43	35	35	...	...	80	51	23,000		General Rayon 6s. "A"	1948	6	J. D.	5,085,000
103	98½	99½	103½	101½	104	90½	189,000	723,000	Gulf Oil, 5s.	1937	5	J. D.	30,414,000
102⅜	99½	100	104	98½	104	99	245,000	2,196,000	Sinking Fund deb. 5s.	1947	5	F. A.	35,000,000
99	90	90	102⅜	90	103½	95⅜	66,000	1,563,000	Koppers G. & C. deb, 5s.	1947	5	J. D.	23,050,000
94⅜	83	83	98⅜	83	98⅜	90½	295,000	3,037,000	Shawinigan W. & P. 4½s. "A"	1967	4½	A. O.	35,000,000
94½	83½	83½	98½	83½	98¾	90¾	113,000	2,855,000	4½s., series "B"	1968	4½	M. N.	16,108,000
104⅛	103	103⅛	104	102	103½	79½	53,000	701,000	Swift & Co., 5s.	1944	5	J. J.	22,916,000
102½	101½	102½	104½	101	103⅜	100⅜	19,000	220,000	Westvaco Chlorine Prod. 5½s.	1937	5½	M. S.	1,992,000

The Trend of Prices

Important Price Changes

Advances	Sept.	Aug.
Alcohol (New No. 5)	$ 0.25	$ 0.24
Carnauba Wax	.36	.34
Copperas bulk	14.00	13.00
Declines		
Bismuth, metal	$ 1.15	$ 1.50
Copper Sulfate	3.40	3.60
Cream of Tartar	.21¾	.22¾
Japan Wax	.08	.08½
Magnesium, metal	.30	.48
Quicksilver	78.00	79.00
Tartaric Acid, dom.	.26½	.29½
Sodium Acetate	.04½	.05½

England's temporary retreat from the gold standard and the severe stock market decline to the contrary, business in many divisions of the chemical industry showed very definite signs of improvement in the last two weeks of September. Whether this increase in shipments was anything more than the usual seasonal improvement remains to be seen, but in many quarters a feeling existed that buyers were realizing that present levels were, in a great many instances, very attractive levels to contract ahead on.

A large number of price changes were noted during September. After remaining stationary for two months, the CHEMICAL MARKETS Average Price for 20 representative chemicals went lower. Copper sulfate reached $3.40, a decrease of 20 cents, per 100 lbs., and alcohol was raised 1c a gal. Two outstanding reductions were announced in magnesium metal and bismuth. The highly competitive position in tartaric acid became worse when domestic producers again slashed prices early in the month only to find that imported material was also reduced further. The situation in quicksilver became more acute. Most of the gums declined, the trend in waxes was mixed, naval stores prices generally were lower, shellac markets remained unchanged in the face of light demand, while the fats and oils presented very little change. Casein markets, oils with the exception of linseed, which again proved very weak, strengthened and on Oct. 1, benzol, solvent naphtha, toluol, and xylol prices were advanced.

*Ammonia basis

The weakest spot in the entire price picture is in fertilizer material. In the nitrogenous products the decline has been the sharpest. Prices for natural nitrate of soda were announced on Oct. 1 following the publication of the cyanamid price of 97½c*. Nitrate in bags is based on $36 in 100 lb. bags, 70c a ton less in 200 lb. bags and $2.00 a ton less in bulk. This is roughly a reduction of 30c a 100 lbs. Buyers are making inquiries for 1932 prices in several items, It is expected that sellers will withhold prices however, until late in the year when it is hoped that further signs of progress will be more discernible. At the moment there appears to be little likelihood that prices generally will go much lower and in a few commodities it is quite certain that producers are going to make strenuous attempts to bring prices up to a more profitable level.

In sympathy with the sharp losses in stocks and bonds most of the commodities sank to lower levels in September, several registering record lows. Cotton sold at $5.85c lowest price for the past century, wheat, corn, rubber, wool, gasoline and copper exhibited further weakness.

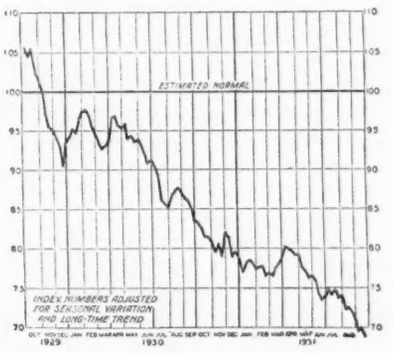
The National Fertilizer Association weekly wholesale price index based on 476 commodity prices showed the effect of these declines during the month.

	Week ended Sept. 26, 1931	Per cent change from preceding Week	Year
Fertilizer materials	75.0	—0.3	—12.5
Mixed fertilizer	80.1	none	—16.6
Fats and oils	58.2	—2.5	—28.5
Metals	77.0	+1.0	— 7.7
Fuel	58.5	—2.2	—30.2
Chemicals & drugs	86.8	none	— 8.6
All groups combined	67.3	—0.4	—16.5

Times Activity Index Off

	—Week Ended— Sept. 19 1931	Sept. 12 1931	Sept. 20 1930
Freight car loadings	*66.9	68.6	85.3
Steel mill activity	41.8	43.5	86.3
Elec. power prod.	81.1	81.5	90.7
Automobile prod.	45.2	45.3	62.4
Cotton cloth prod.	88.1	93.0	70.8
Combined index	*68.9	70.0	85.2

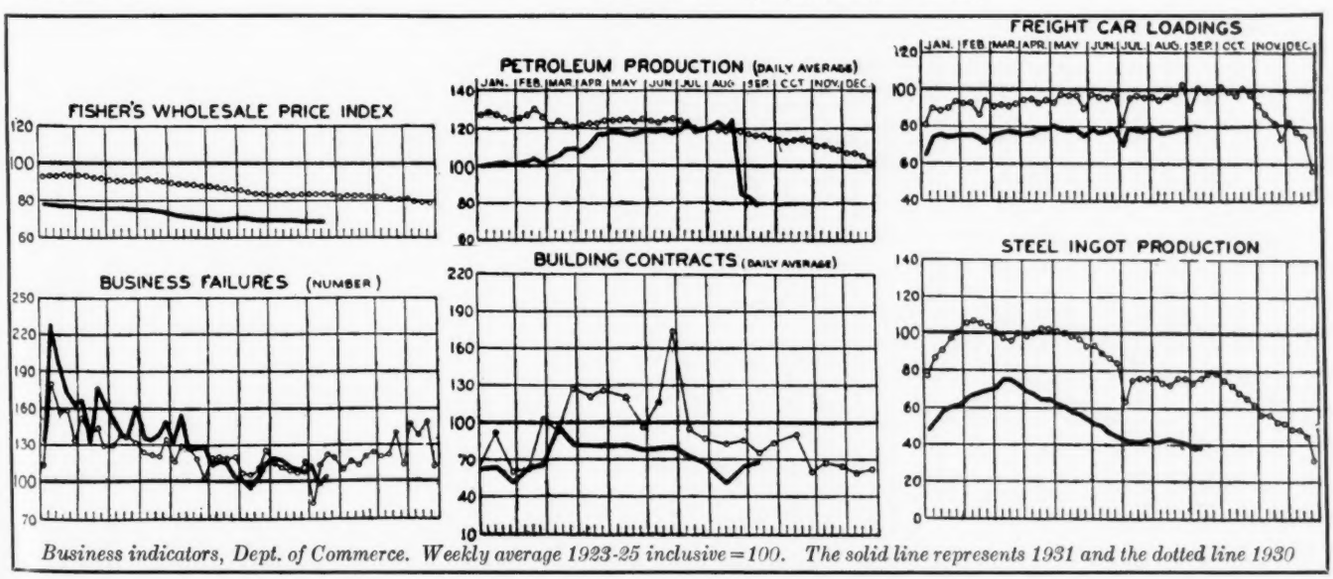
*Subject to revision.



Indices of Business

	Latest Available Month	Previous Month	Year Ago
Automobile Production, July	218,961	250,657	265,533
†Brokers Loans, Sept. 1	$1,354	$1,344	$3,598
*Building Contracts, Aug.	$233,106	$285,997	$347,318
*Car Loadings, Sept. 26	667	759	965
†Commercial Paper, July	$289	$292	$528
Factory Payrolls, July	64.3	64.4	81.7
*Mail Order Sales, July	$46,093	$49,480	$48,790
Number of Failures, Dun, Aug.	1,944	1,983	1,913
*Merchandise Imports, Aug. 1	$166,000	$176,000	$218,359
*Merchandise Exports, Aug.	$165,000	$187,000	$298,118
Furnaces in Blast %, Sept. 1	24.2	26.1	43.4
*Steel Unfinished Orders, Aug. 31	3,169	3,404	3,580

*000 omitted. †000,000 omitted. A. May.



Business indicators, Dept. of Commerce. Weekly average 1923-25 inclusive = 100. The solid line represents 1931 and the dotted line 1930

Prices Current

Heavy Chemicals, Coaltar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

CHEMICAL MARKETS Average Price for 20 representative chemicals moved down in September after holding at the June level during July and August. The reduction of 20 cents per hundred pounds in copper sulfate was not offset by the increase of one cent a gallon in No. 5 alcohol caused by the change in denaturants. The former Price level in August stood at .0646 cents. and at the end of September .0645.

Acetone — A firm undertone prevailed in the market during the past month. The statement in last month's report of an announcement having been made by producers of a ¼c reduction was in error. The change in price was in sodium acetate which fluctuated rather widely in August. Countries within the British Empire absorbed about two-thirds of the total United States exports of acetone. During the first half of 1931, 1,826,941 pounds, worth $139,766 showed a smaller unit value, compared to the shipments of 1,564,000 pounds, invoiced at $171,559 in the first half of 1930. The following table shows outgoing shipments of acetone during the first six months of 1931:

*British Empire**	*Pounds*
United Kingdom	550,930
Canada	458,760
Australia	113,050
Other British	6,229
Total to British Empire	1,128,969
Other Countries	*Pounds*
Japan	272,786
Belgium	182,000
Latin America	23,962
Other Countries	219,224
Total all countries	1,826,941

Acid Acetic — A seasonal lull in the dyeing centers brought about a temporary reduction in shipments, but producers were pointing to other consuming centers where the demand held at or above the level maintained for the past four or five months.

Acid Chromic — Despite the fact that October is usually one of the busiest in the automotive field, producers were finding it difficult to obtain much willingness on the part of buyers to book shipments ahead. Plating schedules are such that buyers are insisting on small purchases to cover only their most immediate needs. The price remains unaltered.

*Dept. of Commerce

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Acetaldehyde, drs 1c-1 wks...lb.	.18½	.21 .18½	.21	.21	.18½	.21	.18½
Acetaldol, 50 gal dr.....lb.	.27	.31 .27	.31	.31	.27	.31	.27
Acetamide.....lb.	.95	1.35 .95	1.35	1.35	1.20		
Acetanilid, tech, 150 lb bbl...lb.	.20	.23 .20	.23	.23	.21	.24	.21
Acetic Anhydride, 92-95%, 100 lb cbys.....lb.	.21	.25 .21	.25	.29	.25	.35	.28
Acetin, tech drums.....lb.	.30	.32 .30	.32	.32	.30	.32	.30
Acetone, tanks.....lb.	....	.10 .10	.10½	.12	.11	.16	.11
Acetone Oil, bbls NY.....gal.	1.15	1.25 1.15	1.25	1.25	1.15	1.25	1.15
Acetyl Chloride, 100 lb cby...lb.	.55	.68 .55	.68	.68	.55	.68	.45
Acetylene Tetrachloride (see tetrachlorethane).....							
Acids							
Acid Abietic.....	.12	.12 .12	.12	.....	.....	.....	.....
Acetic, 28% 400 lb bbls c-1 wks.....100 lb.	.....	2.60	2.60	3.88	2.60	3.88	3.88
Glacial, bbl c-1 wk.....100 lb.	.....	9.23	9.23	13.68	9.23	13.68	13.68
Glacial, tanks.....	.....	8.98	8.98	13.43	8.98		
Adipic.....	.72	.72 .72	.72	.....	.....	.....	.....
Anthranilic, refd, bbls.....lb.	.85	.95 .85	.95	1.00	.85	1.00	.98
Technical, bbls.....lb.	.65	.70 .65	.80	.80	.75	.80	.80
Battery, cbys.....100 lb.	1.60	2.25 1.60	2.25	2.25	1.60	2.25	1.60
Benzoic, tech, 100 lb bbls....lb.	.35	.45 .35	.45	.53	.40	.60	.51
Boric, crys. powd, 250 lb bbls.....lb.	.06½	.07 .06½	.07½	.07½	.06½	.07½	.05½
Broenner's, bbls.....lb.	1.20	1.25 1.20	1.25	1.25	1.20	1.25	1.25
Butyric, 100% basis cbys.....lb.	.80	.85 .80	.85	.90	.80	.90	.85
Camphoric.....lb.	.....	5.25	5.25	5.25	5.25	5.25	4.85
Chlorosulfonic, 1500 lb drums wks.....lb.	.04½	.05½ .04½	.05½	.05½	.04½	.05½	.04½
Chromic, 99¾%, drs.....lb.	.14½	.16 .14½	.17	.19	.15	.23	.17½
Chromotropic, 300 lb bbls....lb.	1.00	1.06 1.00	1.06	1.06	1.00	1.06	1.00
Citric, USP, crystals, 230 lb bbls.....lb.	.....	.35 .35	.43	.59	.40	.70	.46
Cleve's, 250 lb bbls.....lb.	.52	.54 .52	.54	.54	.52	.59	.52
Cresylic, 95%, dark drs NY..gal.	.47	.60 .47	.60	.70	.54	.54	.60
97-99%, pale drs NY.....gal.	.50	.60 .50	.60	.77	.58	.77	.72
Formic, tech 90%, 140 lb. cby.....lb.	.10½	.12 .10½	.12	.12	.10½	.12	.10½
Gallic, tech, bbls.....lb.	.60	.70 .60	.70	.55	.50	.12	.50
USP, bbls.....lb.	.....	.74	.74	.74	.74	.55	.74
Gamma, 225 lb bbls wks.....lb.	.77	.80 .77	.80	.80	.77	.80	.74
H, 225 lb bbls wks.....lb.	.60	.70 .60	.70	.70	.65	.99	.80
Hydriodic, USP, 10% soln cby lb.	.....	.67	.67	.67	.67	.72	.67
Hydrobromic, 48%, coml, 155 lb cbys wks.....lb.	.45	.48 .45	.48	.48	.45	.67 .48	.45
Hydrochloric, CP, see Acid Muriatic.....				.....	.....	.....	.....
Hydrocyanic, cylinders wks...lb.	.80	.90 .80	.90	.90	.80	.90	.80
Hydrofluoric, 30%, 400 lb bbls wks.....lb.	.....	.06	.06	.06½	.06	.06	.06
Hydrofluosilicic, 35%, 400 lb bbls wks.....lb.	...11	.12 .11	.12	.12	.11	.11	.11
Hypophosphorous, 30%, USP, demijohns.....lb.	.....	.85	.85	.85	.85	.85	.85
Lactic, 22%, dark, 500 lb bbls lb.	.04	.04½ .04	.04½	.05	.04	.05½	.04½
44%, light, 500 lb bbls.....lb.	.11½	.12 .11½	.12	.12	.11	.12½	.11
Laurent's, 250 lb bbls.....lb.	.36	.42 .36	.42	.42	.36	.42	.40
Linoleic.....lb.	.16	.16 .16	.16	.....	.....	.....	.....
Malic, powd., kegs.....lb.	.45	.60 .45	.60	.60	.45	.60	.48
Metanilic, 250 lb bbls.....lb.	.60	.65 .60	.65	.65	.60	.65	.60
Mixed Sulfuric-Nitric.....							
tanks wks.....N unit	.07	.07½ .07	.07½	.07½	.07	.07½	.07
tanks wks.....S unit	.008	.01 .008	.01	.01	.008	.01	.008
Monochloroacetic, tech bbl..lb.	.20	.30 .20	.30	.30	.18	.21	.18
Monosulfonic, bbls.....lb.	1.65	1.70 1.65	1.70	1.70	1.65	1.70	1.65
Muriatic, 18 deg, 120 lb cbys c-1 wks.....100 lb.	.....	1.35	1.35	1.35	1.35	1.40	1.35
tanks, wks. 100 lb.		1.00	1.00	1.00	1.00	1.00	1.00
20 degrees, cbys wks...100 lb.	.....	1.45	1.45	....	1.45	....	1.45
N & W, 250 lb bbls.....	.85	.95 .85	.95	.95	.85	.95	.85
Naphthionic, tech, 250 lb.....	.60	.65 .60	.65	Nom.	.....	.59	.55
Nitric, 36 deg, 135 lb cbys c-wks.....100 lb.	.....	5.00	5.00	5.00	5.00	5.00	5.00
40 deg, 135 lb cbys, c-1 wks.....100 lb.	.....	6.00	6.00	6.00	6.00	6.00	6.00
Oxalic, 300 lb bbls wks NY...lb.	.11	.11½ .10½	.11½	.11½	.11	.11½	.11
Phosphoric 50%, U. S. P.....lb.	.....	.14	.14	.14	.14	.14	.08
Syrupy, USP, 70 lb drs....lb.	.....	.14	.14	)	.14	.16	.14
Commercial, tanks,.....Unit.	.....	.80	.80	.80	.80	.....	.....
Picramic, 300 lb bbls.....lb.	.65	.70 .65	.70	.70	.65	.70	.65
Picric, kegs.....lb.	.30	.50 .30	.50	.50	.30	.50	.30
Pyrogallic, crystals..... .....lb.	1.50	1.60 1.50	1.60	1.60	1.30	1.40	.86
Salicylic, tech, 125 lb bbl.....lb.	.33	.37 .33	.37	.37	.33	.42	.33
Sulfanilic, 250 lb bbls.....lb.	.15	.16 .15	.16	.16	.15	.16	.15
Sulfuric, 66 deg, 180 lb cbys 1c-1 wks.....100 lb.	1.60	1.95 1.60	1.95	1.95	1.60	1.95	1.60
tanks, wks. ton		15.00	15.00	15.50	15.00	15.50	15.50
1500 lb dr wks.....100 lb.	1.50	1.65 1.50	1.65	1.65	1.50	1.65	1.50
60°, 1500 lb dr wks....100 lb.	1.27½	1.42½ 1.27½	1.42½	1.42½	1.27½	1.42½	1.27½

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1 00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

Acid Citric — The highly competitive position of the last six or eight months appeared to have abated temporarily. A slight seasonal decrease in shipments was noted.

Acid Oxalic — The market maintained a firm tone in the face of irregular demand from most consuming industries. A slight pick-up was expected shortly from the coal companies. In recent years, this tonnage has been of very large volume.

Acid Sulfuric — With fertilizer operations virtually at a standstill, the market in the southern sections was a very routine affair. Producers are, in most instances, holding production very close to consuming figures and therefore the price situation appears unchanged. No indication has yet been given on 1932 prices but it is expected that they will be repeated.

Acid Tartaric — The competitive position in this organic acid became specially acute during September. Two separate reductions by domestic producers were met by a further drop by importers. Apparently the foreign cartel is making serious efforts to stay in the American market in the face of serious price reductions. July imports were 210,428 pounds, as compared wth 112,463 pounds.

Alcohol — The price on the new C. D. formula 5, was announced as being one cent higher due to increased cost of denaturants. The new schedule is 25c in tanks and 28c in drums. Producers reported satisfactory shipments into the anti-freeze channels and one company announced a series of broadcasts in an effort to build up the sales in the automotive field.

Ammonia Anhydrous — Movement against existing contracts was in good volume, but spot business was off slightly from the high of August. It is expected that the contract price to be named shortly will duplicate the present price.

Ammonia Aqua — A slackening in demand was noticeable in the withdrawals for the textile centers. The undertone of the market was steady and prices unchanged.

Antimony — It was reported that sellers were inclined to shade the 6½c price on worthwhile business.

Ammonium Sulfate — The last month was a rather quiet one. Importers continued to quote $23-$24 a ton while domestic producers were holding firmly at the $26 level. Abroad and specially in England the price situation has become visibly weaker, but with the cessation of the gold standard it was expected that some slight increase might occur as such action almost always results in the inflation of prices. Actual tonnages sold in this coun-

*New formula

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Oleum, 20%, 1500 lb. drs 1c-1 wks ton	.....	18.50	.....	18.50	18.50	18.50	18.50	18.50
40%, 1c-1 wks net ton	.....	42.00	.....	42.00	42.00	42.00	42.00	42.00
Tannic, tech, 300 lb bbls lb.	.23	.40	.23	.40	.40	.23	.40	.30
Tartaric, USP, gran. powd, 300 lb. bbls lb	.....	.26½	.26½	.29½	.38½	.33	.38½	.38
Tobias, 250 lb bbls. lb.	.....	.85	.....	.85	.85	.85	.85	.85
Trichloroacetic bottles lb.	.....	2.75	.....	2.75	2.75	2.75	2.75	2.75
Kegs lb.	.....	2.00	.....	2.00	2.00	2.00	2.00	2.00
Tungstic, bbls lb.	1.40	1.70	1.40	1.70	1.70	1.40	2.25	1.00
Albumen, blood, 225 lb bbls lb.	.38	.40	.38	.40	.40	.38	47	.38
dark, bbls., lb.	.12	.20	.12	20	.20	.12	.20	.12
Egg, edible lb.	.....	.60	.55	.60	.75	.55	.83	.70
Technical, 200 lb cases lb.	.....	.50	.48	.50	.73	.50	.80	.70
Vegetable, edible lb.	.60	.65	.60	.65	.65	.60	.65	.60
Technical lb.	.50	.55	.50	.55	.55	.50	.55	.50
Alcohol								
Alcohol Butyl, Normal, 50 gal drs c-1 wks lb.	.16½	.17½	.16½	.17½	.18½	.17½	.17½	.17½
Drums, 1-c-1 wks lb.	.16½	.17½	.16½	.17½	.18½	.17½	.18½	.17½
Tank cars wks lb.	.15½	.16½	.15½	.16½	.17½	.16½	.17½	.16½
Amyl (from pentane) Tanks wks lb.	.....	.203	.203	.236	.236	.236	1.67	1.67
Diacetone, 50 gal drs del gal.	1.42	1.60	1.42	1.60	1.60	1.42	1.80	1.42
Ethyl, USP, 190 pf, 50 gal bbls gal.	2.55	2.65	2.37	2.75	2.75	2.63	2.75	2.69½
Anhydrous, drums gal.	.54	.58	.54	.60	.71	.56	.71	.71
No. 5,*188 pf, 50 gal drs. drums extra gal.	.28	.29	.27	.44	50	.40	.51	.48
*Tank, cars gal.	.....	.25	.24	.38	.48	.37	.50	.46
Isopropyl, ref, gal drs gal.	.60	.65	.60	1.00	1.00	.60	1.30	1.00
Propyl Normal, 50 gal dr. gal.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Alcotate, tanks gal.	.....	.60	.60	.60	.....	.....	.....	.....
Aldehyde Ammonia, 100 gal dr lb.	.80	.82	.80	.82	.82	.80	.82	.80
Alpha-Naphthol, crude, 300 lb bbls lb.	.60	.65	.60	.65	.65	.60	.65	.65
Alpha-Naphthylamine, 350 lb bbls lb.	.32	.34	.32	.34	.34	.32	.34	.32
Alum Ammonia, lump, 400 lb bbls, 1c-1 wks 100 lb.	3.20	3.50	3.20	3.50	3.50	3.20	3.50	3.25
Chrome, 500 lb casks, wks 100 lb.	4.50	5.25	4.50	5.25	5.25	4.50	5.50	5.00
Potash, lump, 400 lb casks wks 100 lb.	3.25	3.50	3.10	3.50	3.50	3.10	3.50	3.00
Soda, ground, 400 lb bbls wks 100 lb.	3.50	3.75	3.50	3.75	3.75	3.50	3.75	3.75
Aluminum Metal, c-1 NY 100 lb.	22.90	24.30	22.90	24.30	24.30	24.30	24.30	24.30
Chloride Anhydrous, lb.	.05	.09	.05	.09	.15	.05	.20	.05
Hydrate, 96%, light, 90 lb bbls lb.	.16	.17	.16	.17	.18	.16	.18	.17
Stearate, 100 lb bbls lb.	.20	.21	.18	.22	.26	.19	.26	25
Sulfate, Iron, free, bags c-1 wks 100 lb.	1.90	1.95	1.90	1.95	2.05	1.90	2.05	1.95
Coml, bags c-1 wks 100 lb.	1.25	1.30	1.25	1.30	1.40	1.25	1.40	1.40
Aminoazobenzene, 110 lb kegs lb.	.....	1.15	.....	1.15	1.15	1.15	1.15	1.15
Ammonium								
Ammonia anhydrous Com. tanks	.....	.05½	.....	.05½	.05½	.05½		
Ammonia, anhyd, 100 lb cyl. lb.	.15½	.15½	.15½	.15½	.15½	.15½	.14½	.14
Water, 26°, 800 lb dr del lb.	.02½	.03	.02½	.03½	.03½	.03½	.03½	.03½
Ammonia, aqua 26° tanks	.....	.02½	.02½	.02½	.02½	.02½		
Acetate lb.	.28	.39	.28	.39	.39	.28		
Bicarbonate, bbls., f.o.b. plant 100 lb.	.....	5.15	.....	5.15	5.15	5.15	6.50	5.15
Bifluoride, 300 lb bbls lb.	.21	.22	.21	.22	.22	.21	.22	.21
Carbonate, tech, 500 lb cs. lb.	.10½	.12	.09	.12	.12	.09	.12	.09
Chloride, white, 100 lb. bbls wks 100 lb.	4.45	5.15	4.45	5.15	5.15	4.45	5.15	4.45
Gray, 250 lb bbls wks lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Lump, 500 lb cks spot lb.	.11	.11½	.11	.11½	.11½	.11	.11½	.11
Lactate, 500 lb bbls lb.	.15	.16	.15	.16	.16	.15	.16	.15
Ammonium Linoleate lb.	.15	.15	.15	.....	.....	.....	.....	.....
Nitrate, tech, casks lb.	.06	.10	.06	.10	.10	.06	.10	.06
Persulfate, 112 lb kegs lb.	.26	.30	.26	.30	.30	.26	.34	.26
Phosphate, tech, powd, 325 lb bbls lb.	.11½	.12	.11½	.12	.13	.11½	.13	.12½
Sulfate, bulk c-1 100 lb.	.....	1.30	1.30	1.80	2.10	1.75	2.40	2.05
Southern points 100 lb.	.....	1.30	1.30	1.75	2.10	1.82½	2.45	2.05
Nitrate, 26% nitrogen 31.6% ammonia imported bags c. i. f. ton	34.60	35.00	34.60	35.00	57.60	45.00	60.85	52.40
Sulfocyanide, kegs lb.	.36	.48	.36	.48	.48	.36	.48	.36
Amyl Acetate, (from pentane) Tanks lb.	.....	.222	.....	.222	.236	.222	1.70	1.60
Tech., drs lb.	.225	.236	.225	.236	.24	.225	.24	.23
Alcohol, see Fusel Oil								
Furoate, 1 lb tins lb.		5.00	.....	5.00	5.00	5.00		
Aniline Oil, 960 lb drs lb.	.14½	.16	.14½	.16	.16	.15	.16½	.15
Annatto, fine lb.	.34	.37	.34	.37	.37	.34	.37	.34
Anthraquinone, sublimed, 125 lb bbls lb.	.50	.55	.50	.55	.90	.50	.90	.80
Antimony, metal slabs, ton lots lb.	.....	.06¾	.06¾	.07½	.09½	.06½	.10	.08½
Needle, powd, 100 lb cs lb.	.08½	.09	.08½	.09	.09½	.08	.10	.09
Chloride, soln (butter of) cbys lb.	.13	.17	.13	.17	.17	.13	.18	.13
Oxide, 500 lb bbls lb.	.08½	.08¾	.08½	.08¾	.08¾	.07½	.10	.08¾
Salt, 66%, tins lb.	.22	.24	.22	.24	.24	.22	.26	.24
Sulfuret, golden, bbls lb.	.16	.20	.16	.20	.20	.16	.20	.16
Vermilion, bbls lb.	.38	.42	.38	.42	.42	.38	.42	.38
Archil, conc, 600 lb bbls lb.	.17	.19	.17	.19	.19	.17	.19	.17
Double, 600 lb bbls lb.	.12	.14	.12	.14	.14	.12	.14	.12
Triple, 600 lb bbls lb.	.12	.14	.12	.14	.14	.12	.16	.12
Argols, 80%, casks lb.	.....	.18¾	.....	.18¾	.18¾	.18¾	.18¾	.18¾
Crude, 30%, casks lb.	.07	.07½	.07	.08	.08	.07½	.08	.08

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

try of either imported or domestic was very small.

Beeswax — Buying during the month was of a very routine nature with consumers purchasing in very small quantities. During the past month the Department of Commerce released figures covering importations of the principal gums and waxes. The following table shows a decrease of 5,380,704 pounds during the first seven months of this year in comparison with the importations during the corresponding time a year ago:

	Pounds	
	1931	*1930*
Arabic	5,926,745	5,044,076
Beeswax	2,372,437	2,751,763
Camphor, crude	1,017,243	555,552
refined	801,969	572,534
synthetic	1,387,252	1,367,470
Carnauba	5,555,578	4,359,843
Chicle	5,848,328	10,420,934
Karaya	2,915,452	2,295,399
Shellac, orange	8,148,155	13,765,284
seed, button, sticklac	4,104,924	4,298,248
Tragacanth	935,963	759,018
Vegetable wax	1,557,866	1,476,110
All other but varnish gums	4,839,232	3,125,620
Totals	45,411,147	50,791,851

Benzol — Principal factors announced an increase of 2c a gallon in both the 90% and the pure grades, the new level being 20c. Continued curtailment of by-product operations because of the low demand for steel has reduced stocks of several of the paint solvents. Should steel mill production rise from the 29% level now prevailing it is likely that the present shortage would be speedily corrected. German imports of benzol during the first half of 1931 showed a drop of almost 50% compared to the six months of 1930 as indicated in the following table:

*Country of Origin**	*Jan.-June 1930* *Metric tons*	*Jan.-June 1931* *Metric tons*
United States	69,610	23,941
Saar district	12,524	14,100
Belgium	14,202	6,077
Poland	10,006	3,310
France	242	92
Great Britain	689	2,134
Netherlands	5,890	6,758
Sweden	525	40
Czechoslovakia	7,550	5,547
Soviet Russia	257	350
Other countries	116	...
Total	121,611	62,349

Bismuth — Due to unsettled conditions abroad and a lessened demand in this country the metal was reduced to $1.15 in ton lots and in 100 lb. cases, $1.45. In sympathy with this decline several of the fine chemical derivatives went to lower prices.

Bleaching Powder — The market went through a very irregular period. Sales and shipments were spotty. Prices remained firm and unchanged, however, and buyers were requesting prices for next year. Some feeling exists in the market that chlorine prices may be higher and if so, this would, of course, have a definite relationship to bleaching powder prices.

*Dept. of Commerce

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Aroclors, wks. lb.	.20	.20	.40	.40	.20	.....	.....
Arsenic, Red. 224 lb kegs, cs. lb.	.09½	.09½	.10	.11	.08½	.11	.09
White, 112 lb kegs. lb.	.04	.03½	.05	.04½	.03½	.04½	.04
Asbestine, c-l wks. ton	.....	15.00	.....	15.00	15.00	15.00	15.00	4.75
Barium								
Barium Carbonate, 200 lb bags wks. ton	56.50	57.00	56.50	60.00	60.00	58.00	60.00	57.00
Chlorate, 112 lb kegs NY. lb.	.14	.15	.14	.15	.15	.14	.15	.14
Chloride, 600 lb bbl wks. ton	63.00	69.00	63.00	69.00	69.00	63.00	69.00	63.00
Dioxide, 88%, 690 lb drs. lb.	.12	.13	.12	.13	.13	.12	.13	.12
Hydrate, 500 lb bbls. lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½	.04½
Nitrate, 700 lb casks. lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½	.08
Barytes, Floated, 350 lb bbls wks. ton	23.00	24.00	23.00	24.00	24.00	23.00	24.00	23.00
Bauxite, bulk, mines. ton	5.00	6.00	5.00	8.00	8.00	5.00	8.00	5.00
Beeswax, Yellow, crude bags. lb.	.22	.24	.22	.31	.34	.24	.37	.34
Refined, cases. lb.	.26	.28	.26	.37	.38	.37	.42	.39
White, cases. lb.	.....	.36	.34	.36	.53	.34	.53	.51
Benzaldehyde, technical, 945 lb drums wks. lb.	.60	.65	.60	.65	.65	.60	.65	.60
Benzene								
Benzene, 90%, Industrial, 8000 gal tanks wks. gal.	.18	.19	.18	.21	.22	.21	.23	.23
Ind. Pure, tanks works. gal.	.18	.19	.18	.21	.22	.21	.23	.23
Benzidine Base, dry, 250 lb bbls. lb.	.65	.67	.65	.67	.74	.65	.74	.70
Benzoyl, Chloride, 500 lb drs. lb.	.45	.47	.45	.47	1.00	.45	1.00	1.00
Benzyl, Chloride, tech drs. lb.	.....	.30	.....	.30	.25	.25	.25	.25
Beta-Naphthol, 250 lb bbl wk. lb.	.22	.24	.22	.24	.24	.22	.26	.22
Naphthylamine, sublimed, 200 lb bbls. lb.	1.25	1.35	1.25	1.35	1.35	1.25	1.35	1.35
Tech, 200 lb bbls. lb.	.53	.58	.53	.65	.65	.53	.68	.60
Blanc Fixe, 400 lb bbls wks. ton	75.00	90.00	75.00	90.00	90.00	75.00	90.00	75.00
Bleaching Powder								
Bleaching Powder, 300 lb drs c-l wks contract. 100 lb.	1.75	2.00	1.75	2.35	2.35	2.00	2.25	2.00
Blood, Dried, fob, NY. Unit	.....	1.65	1.65	3.00	3.90	3.00	4.60	3.90
Chicago. Unit	1.50	1.60	1.50	2.35	4.50	2.75	5.00	4.40
S. American shipt. Unit	.....	Nom.	2.20	3.20	4.10	3.15	4.70	4.25
Blues, Bronze Chinese Milori Prussian Soluble. lb.	.....	.35	.....	.35	.35	.35	.35	.32
Bone, raw, Chicago. ton	.....	24.00	24.00	32.00	39.00	31.00	42.00	39.00
Bone, Ash, 100 lb kegs. lb.	.06	.07	.06	.07	.07	.06	.07	.06
Black, 200 lb bbls. lb.	.05½	.08½	.05½	.08½	.08½	.05½	.08½	.08½
Meal, 3% & 50%, Imp. ton	.....	21.00	21.00	31.00	31.00	31.00	35.00	30.00
Borax, bags. lb.	.02½	.03½	.02½	.03½	.03½	02½	.03½	.02½
Bordeaux, Mixture, 16% pwd. lb.	.11½	.13	.11½	.13	.14	.12	.14	.10½
Paste, bbls. lb.	.11½	.13	.11½	.13	.14	.12	.14	.10
Brazilwood, sticks, shpmt. lb.	26.00	28.00	26.00	28.00	28.00	26.00	28.00	26.00
Bromine, cases. lb.	.36	.43	.36	.43	.47	.38		
Bronze, Aluminum, powd blk. lb.	.60	1.20	.60	1.20	1.20	.60	1.20	.60
Gold bulk. lb.	.55	1.25	.55	1.25	1.25	.55	1.25	.55
Butyl, Acetate, normal drs. lb.	.17	.175	.17	.175	.20	.17	.195	.184
Tank, wks. lb.	.16	.175	.16	.175	.186	.16	.186	.181
Aldehyde, 50 gal drs wks. lb.	.34	.44	.34	.44	.44	.34	.70	.34
Carbitol s ee Diethylene Glycol Mono (Butyl Ether)	.....	.....	.....	.....	.....	.....	.....	.....
Cellosolve (see Ethylene glycol mono butyl ether)	.....	.....	.....	.....	.....	.....	.....	.....
Furoate, tech., 50 gal. dr., lb.	.....	.50	.....	.50	.50	.50	.50	.50
Propionate, drs. lb.	.22	.25	.22	.25	.27	.22	.36	.25
Stearate, 50 gal drs. lb.	.25	.30	.25	.30	.30	.25	.60	.25
Tartrate, drs. lb.	.55	.60	.55	.60	.60	.55	.60	.57
Cadmium, Sulfide, boxes. lb.	.65	.90	.65	.90	1.75	.90	1.75	.75
Calcium								
Calcium, Acetate, 150 lb bags c-l. 100 lb.	.....	2.00	.....	2.00	4.50	2.00	4.50	4.50
Arsenate, 100 lb bbls c-l wks. lb.	.07	.09	.07	.09	.09	.07	.09	.07
Carbide, drs. lb.	.05	.06	.05	.06	.06	.05	.06	.05
Carbonate, tech, 100 lb bags c-l. lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, Flake, 375 lb drs c-l wks. ton	.....	22.75	.....	22.75	22.75	22.75	25.00	22.75
Solid, 650 lb drs c-l fob wks ton	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Nitrate, 100 lb bags. ton	40.00	43.00	40.00	43.00	43.00	40.00	52.00	42.00
Peroxide, 100 lb. drs. lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Phosphate, tech, 450 lb bbls lb.	.08	.08½	.08	.08½	.08½	.08	.08	.07
Stearate, 100 lb bbls. lb.	.18	.22	.18	.22	.26	.19	.26	.25
Calurea, bags S. points. c.i.f. ton	.....	88.65	.....	88.65	88.65	88.65	88.15	82.15
Camwood, Bark, ground bbls. lb.	.....	.18	.....	.18	.18	.18	.18	.18
Candelilla Wax, bags. lb.	.14	.14½	.13	.15	.20	.15	.24	.22
Carbitol, (See Diethylene Glycol Mono Ethyl Ether)	.....	.....	.....	.....	.....	.....	.....	.....
Carbon, Decolorizing, 40 lb bags c-l. lb.	.08	.15	.08	.15	.15	.08	.15	.08
Black, 100-300 lb cases lc-l NY. lb.	.06	.12	.06	.12	.12	.06	.12	.12
Bisulfide, 500 lb drs lc-l NY. lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Dioxide, Liq. 20-25 lb cyl. lb.	.....	.06	.....	.06	.18	.06	.06	.06
Tetrachloride, 1400 lb drs delivered. lb.	.06½	.07	.06½	.07	.07	.06½	.07½	.06½
Carnauba Wax, Flor, bags. lb.	.26	.28	.26	.28	.37	.28	.43	.35
No. 1 Yellow, bags. lb.	.31½	.33	.23	.40	.33	.25	.40	.33
No. 2 N Country, bags. lb.	.....	.17½	.17½	.23	.27	.20	.32	.28
No. 2 Regular, bags. lb.	.....	.36	.21	.23	.30	.23	.36	.31
No. 3 N. C. lb.	.13½	.14¼	.13½	.16	.23	.16	.25	.24
No. 3 Chalky. lb.	.13½	.15	.13½	.15½	.23	.16	.26	.24
Casein, Standard, Domestic ground. lb.	.06	.07	.06	.10	.15½	.09½	.17	.15

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

Butanol — Producers have not made any change in price and the market continues to have a very firm undertone. Volume of shipments in September were said to be off from August.

Calcium Chloride — With the active buying season for road work over, producers were of the opinion that tonnages did not compare as favorably with 1930 as they had first anticipated they would. Demand from other outlets was only fair.

Carbon Black — Leading factors continued to quote 3c Texas. No noticeable improvement occurred in the demand.

Carnauba Wax — This was a strong item in the list of waxes. With stocks again below requirements dealers raised No. 2 to 36c.

Casein — Domestic producers apparently were able to stem the swift descent in prices that brought the domestic grades down to the 6½c-7c level. The market was much firmer in tone and leading factors were of the opinion that any movement in the near future would be upward.

Chlorine — While the demand in most lines fell off slightly in September from August, shipments for water purification purposes held up fairly well. Interest centers, at the moment, in 1932 contract prices. The tank car price is said to be very close to actual production costs and in some quarters it is thought that producers may endeavor to obtain a higher figure for tanks.

Chrome Green — Some shading of prices was reported but no change was made in the public quotations.

Coal-Tar Dyes — A slight slackening in demand was reported from both the textile and the tanning industries, but prices remained firm and unchanged in most items. Exports of coal-tar colors, dyes, stains and color lakes during the first six months of 1931 went to 63 world markets. The 10 leading countries of destination are shown in the following table:

*	*Jan.-June, inclus., 1931* Pounds	Value
China	8,058,521	$1,127,407
Japan	710,773	426,764
Canada	845,940	372,061
British India	699,157	303,838
Germany	387,204	78,579
Belgium	210,809	52,640
Mexico	89,067	49,850
Netherlands	221,268	37,040
Hong Kong	123,142	32,011
Argentina	39,295	21,492
Other countries	412,268	177,281
Total six mos., 1931	11,817,544	$2,676,963
Six months, 1930	16,392,425	3,602,396

Copperas — That which has been seriously threatened for several months finally did occur in September. Continued curtailment of steel mill activity has reduced stocks of copperas to such an extent that an increase to $14 a ton was

*Dept. of Commerce

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cellosolve (see Ethylene glycol mono ethyl ether)							
Acetate (see Ethylene glycol mono ethyl ether acetate)							
Celluloid, Scraps, Ivory cs. lb.	.13	.15	.13	.15	.20	.20	.30	.20
Shell, cases lb.	.18	.20	.18	.20	.20	.18	.20	.18
Transparent, cases lb.	.....	.15	.....	.15	.15	.15	.32	.15
Cellulose, Acetate, 50 lb kegs lb.	.80	1.25	.80	1.25	1.25	.80	1.25	1.20
Chalk, dropped, 175 lb bbls. lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Precip, heavy, 560 lb cks. lb.	.02	.03½	.02	.03½	.03½	.02	.03½	.02
Light, 250 lb casks lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02½
Charcoal, Hardwood, lump, bulk wks bu.	.18	.19	.18	.19	.19	.18	.19	.18
Willow, powd, 100 lb bbl wks lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06
Wood, powd, 100 lb bbls. lb.	.04	.05	.04	.05	.05	04	.05	.04
Chestnut, clarified bbls wks. lb.	.02	.03	.02	.03	.03	.02½	.02	.03½
25% tks wks lb.	.01½	.02½	.01½	.02½	.02½	.01½	.02½	.01½
Powd, 60%, 100 lb bgs wks lb.	.....	.04½	.....	.04½	.04½	.04½	.04 4/5	.04½
Powd, decolorized bgs wks. lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
China Clay, lump, blk mines ton	8.00	9.00	8.00	9.00	9.00	8.00	9.00	8.00
Powdered, bbls lb.	.01½	.02	.01½	.02	.02	.01½	.02	.01½
Pulverized, bbls wks ton	10.00	12.00	10.00	12.00	12.00	10.00	12.00	10.00
Imported, lump, bulk ton	15.00	25.00	15.00	25.00	25.00	15.00	25.00	15.00
Powdered, bbls lb.	.01½	.03	.01½	.03	.03	.01½	.03½	.01½
Chlorine								
Chlorine, cyls 1c-1 wks contract lb.	.07	.08½	.07	.08½	.08½	.07	.08½	.07
cyls, cl wks,. contract lb.	.04	.04½	.04	.04½	.04½	.04	.04½	.04½
Liq tank or multi-car lot cyls wks contract lb.	.01½	.02½	.01½	.02½	.025	.01½	.03	.025
Chlorobenzene, Mono, 100 lb drs 1c-1 wks lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.08½
Chloroform, tech, 1000 lb drs. lb.	.15	.16	.15	.16	.16	.15	.20	.16
Chloropicrin, comml cyls lb.	1.00	1.35	1.00	1.35	1.35	1.00	1.35	1.00
Chrome, Green, CP lb.	.26	.29	.26	.29	.29	.26	.29	.26
Commercial lb.	.06½	.11	.06½	.11	.11	.06½	.11	.06½
Yellow lb.	.16	.18	.16	.18	.18	.16	.18	.15
Chromium, Acetate, 8% Chrome bbls lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½	.04½
20° soln, 400 lb bbls lb.	.....	.05½	.....	.05½	.05½	.05½	.05½	.05½
Fluoride, powd, 400 lb bbl. lb.	.27	.28	.27	.28	.28	.27	.28	.27
Oxide, green, bbls lb.	.34½	.35½	.34½	.35½	.35½	.34½	.35½	.34½
Coal tar, bbls bbl	10.00	10.50	10.00	10.50	10.50	10.00	10.50	10.00
Cobalt Oxide, black, bags lb.	1.35	1.45	1.35	2.22	2.22	2.10	2.22	2.10
Cochineal, gray or black bag. lb.	.52	.57	.52	.57	1.01	.52	1.01	.95
Teneriffe silver, bags lb.	.....	.57	.55	.57	.95	.54	.95	.95
Copper								
Copper, metal, electrol 100 lb.	7.00	7.50	7.00	10.36	17.78	9.50	24.00	17.00
Carbonate, 400 lb bbls lb.	.08½	.16½	.08½	.16½	.21½	.08½	.25	.13
Chloride, 250 lb bbls lb.	.22	.25	.22	.25	.28	.22	.28	.25
Cyanide, 100 lb drs lb.	.41	.42	.41	.42	.45	.41	.60	.44
Oxide, red, 100 lb bbls lb.	.15½	.18	.15½	.18	.32	.15½	.32	.16½
Sub-acetate verdigris, 400 lb bbls lb.	.18	.19	.18	.19	.19	.18	.19	.18
Sulfate, bbls c-l wks 100 lb.	.....	3.40	3.40	4.95	5.50	3.95	7.00	5.50
Copperas, crys and sugar bulk c-l wks ton	13.00	14.00	13.00	14.00	14.00	13.00	14.00	13.00
Cotton, Soluble, wet, 100 lb bbls lb.	.40	.42	.40	.42	.42	.40	.42	.40
Cottonseed, S. E. bulk c-l ton	.....	26.50	.....	26.50	.....	.....	.....	.....
Meal S. E. bulk ton	.....	.....	.....	.....	.....	.....	.....	.....
7% Amm., bags mills ton	13.25	38.00	13.25	38.00	38.00	37.50	38.00	37.50
Cream Tartar, USP, 300 lb. bbls lb.	.....	.21¼	.21¼	.24½	.27	.24½	.28	26½
Creosote, USP, 42 lb cbys lb.	.40	.42	.40	.42	.42	.40	.42	.40½
Oil, Grade 1 tanks gal.	.13	.14	.13	.14	.16	.15	.19	.15
Grade 2 gal.	.11	.12	.11	.12	.14	.13	.23	.13
Grade 3 gal.	.11	.12	.11	.12	.14	.13	.28	.13
Cresol, USP, drums lb.	.12½	.16	.12½	.17	.17	.14	.17	.14
Crotonaldehyde, 50 gal dr. lb.	.32	.36	.32	.36	.36	.32	.36	.32
Cudbear, English lb.	.16	.17	.16	.17	.17	.16	.17	.16
Cutch, Rangoon, 100 lb bales lb.	.11	.13	.11	.13	.13	.11	.16	.12½
Borneo, Solid, 100 lb bale lb.	.06½	08½	.06½	.08½	.08½	.06½	.08½	.08
Cyanamide, bags c-l frt allowed Ammonia unit	.....	.97½	.97½	.....	.....	.....	.....	.....
Dextrin, corn, 140 lb bags 100 lb.	.....	3.72	3.47	4.02	4.82	4.42	4.92	4.62
White, 140 lb bags 100 lb.	3.42	3.67	3.42	4.02	4.77	4.17	4.87	4.57
Potato, Yellow, 220 lb bgs. lb.	.08	.09	.08	.09	.09	.08	.09	.08
White, 220 lb bags 1c-1 lb.	.08	.09	.08	.09	.09	.08	.09	.08
Tapioca, 200 lb bags 1c-1. lb.	.08½	.08½	.08½	.08½	.08½	.08	.08½	.08
Diamylphthalate, drs wks gal.	.....	3.80	.....	3.80	3.80	3.80	3.80	3.80
Dianisidine, barrels lb.	2.35	2.70	2.35	2.70	2.70	2.35	3.10	2.70
Dibutylphthalate, wks lb.	.24½	.28	.24½	.28	.28	.24½	.26½	.26½
Dibutyltartrate, 50 gal drs. lb.	.29½	.31½	.29½	.31½	.31½	.29½	.31½	.29½
Dichloroethylether, 50 gal drs lb.	.....	.06	.....	.06	.07	.05	.13	.05
Dichloromethane, drs wks lb.	.55	.65	.55	.65	.65	.55	.65	.55
Diethylamine, 400 lb drs. lb.	2.75	3.00	2.75	3.00	3.00	2.75	3.00	2.75
Diethylcarbonate, drs gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Diethylaniline, 850 lb drs. lb.	.55	.60	.55	.60	.60	.55	.60	.55
Diethyleneglycol, drs lb.	.14	.16	.14	.16	.13	.10	.13	.10
Mono ethyl ether, drs. lb.	.....	.16	.....	.16	.16	.13	.15	.13
Mono butyl ether, drs. lb.	.24	.30	.24	.30	.30	.24	.30	.25
Diethylene oxide, 50 gal dr. lb.	.....	.50	.....	.50	.50	.50	.50	.50
Diethylorthotoluidin, drs. lb.	.64	.67	.64	.67	.67	.64	.67	.64
Diethyl phthalate, 1000 lb drums lb.	.24	.26	.24	.26	.26	.24	.26	.24
Diethylsulfate, technical, 50 gal drums lb.	.30	.35	.30	.35	.35	.30	.35	.30
Dimethylamine, 400 lb drs. lb.	.....	2.62	.....	2.62	2.62	2.62	2.62	2.62
Dimethylaniline, 340 lb drs. lb.	.25	.27	.25	.28	.28	.26	.32	.26

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entirely expected in most quarters and it is felt that unless the steel mills step up production from the 28-30% level prevailing now, that prices may go even higher in the coming contract season. Spot carlots in barrels are now quoted at $21 a ton and less carlot N. Y. at $28.

Copper — The past month was a distinct disappointment. The price sank to 7c the lowest figure on record and August inventories showed a sizable increase in stocks despite all of the efforts of the last six months to curtail production to a figure somewhat in line with present consumption. Reports in the newspapers as the month closed stated that a conference international in scope was being planned in the hope that still more radical reductions could be effected and the market in this commodity restored to something resembling normalcy. Although production of refined copper in North and South America in August reached the lowest point in many years and shipments showed a moderate increase during the month, output continued well in excess of shipments and refined copper stocks at the end of August increased 15,358 tons to 455,775 tons, the greatest stocks of refined copper ever piled up in the history of the industry. Mine output of copper in the United States in August was slightly greater than in July. North American output of blister copper was also higher, and South American output of blister copper showed only a small drop. The following table gives, in short tons, the output of United States mines, blister and refined copper production of North and South America, with stocks of copper here and in South America, Great Britain, etc.:

Production:	*May*	*June*	*July*	*Aug.*
Mines, U. S...	45,480	44,473	38,228	38,925
*Blister, N. A.	66,812	65,110	60,310	62,237
*Blister, S. A..	24,812	24,785	24,611	23,334
Stocks (end of month):				
N. & S. Am.:				
Blister (inc. "in proc's")	190,578	187,358	179,658	176,105
Refined.....	398,667	413,474	440,417	455,775
Total	589,245	600,827	620,075	631,880
Gt. Brit.:				
Refined.....	15,085	18,389	21,423	25,157
Other forms..	1,452	1,382	1,243	1,344
Total.....	16,537	18,445	22,666	26,501
Havre.....	11,045	12,073	10,252	10,709
Japan.....	8,361	8,079	†	† ....

*Includes direct copper. †Not yet available.

Copper Sulfate — Shipments in September were above the same period a year ago. Export sales to South America and sales to the Pacific Coast are satisfactory. With the price reduced to $3.40 per 100 lb., the lowest figure of which there is record, buyers are in a favorable position and in many instances contracting wherever possible. It is thought that the metal price will remain at or above the present level despite the August figures showing another gain in stocks on hand. With the

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Dimethylsulfate, 100 lb drs...lb.	.45	.50	.45	.50	.50	.45	50	.45
Dinitrobenzene, 400 lb bbls...lb.	.15	.16	.15	.16½	.16½	.15½	.16½	.15
Dintrochlorobenzene, 400 lb bbls.....lb.	.13	.15	.13	.15	.15	.13	.15	.1
Dinitronaphthalene, 350 lb bbls .....lb.	.34	.37	.34	.37	.37	.34	.37	.34
Dinitrophenol, 350 lb bbls....lb.	.29	.30	.29	.30	.32	.31	.32	.31
Dinitrotoluene, 300 lb bbls...lb.	.16	.17	.16	.17	.18	.16	.19	.17
Diorthotolyguanidine, 275 lb bbls wks.....lb.	.42	.46	.42	.46	.46	.42	.49	.42
Dioxan (See Diethylene Oxide)	.....	.....	.....	.....	...	.....	.....	.....
Diphenyl.....lb.	.20	.40	.20	.40	.50	.20	.50	.40
Diphenylamine.....lb.	.37	.38	.37	.38	.40	.38	.47	.40
Diphenylguanidine, 100 lb bbl lb.	.30	.35	.30	.35	.35	.30	.40	.30
Dip Oil, 25%, drums.....lb.	.26	.30	.26	.30	.30	.26	.30	.26
Divi Divi pods, bgs shipmt..ton	30.00	32.00	28.00	35.00	46.50	35.00	57.00	46.50
Extract.....lb.	.05	.05½	.05	.05½	.05½	.05	.05½	.05
Egg Yolk, 200 lb cases.....lb.	.....	.47	.45	.58	.80	.72	.84	.77
Epsom Salt, tech, 300 lb bbls c-1 NY.....100 lb.	1.70	1.90	1.70	1.90	1.90	1.70	1.90	1.70
Ether, USP anaesthesia 55 lb. drs. .....lb.	.....	.23	.23	.28	.28	.21	.39	.38
USP (Conc.).....lb.	.09	.10	.09	.10	.....	.....	.....	.....
Ethyl Acetate, 85% Ester, ... tanks.....lb.	.....	.08	.08	.088	.115	.085	.122	.108
drums.....lb.	.09	.095	.09	.10	.158	.094	.129	.111
Anhydrous, tanks.....lb.	.....	.119	.....	.119	.142	.119		
drums.....lb.	.115	.121	.115	.121	.156	.115		
Acetoacetate, 50 gal drs....lb.	.65	.68	.65	.68	.68	.65	.68	.65
Benzylaniline, 300 lb drs...lb.	.88	.90	.88	.90	1.11	.88	1.11	1.05
Bromide, tech, drums .....lb.	.50	.55	.50	.55	.55	.50	.55	.50
Carbonate, 90%, 50 gal drs gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Chloride, 200 lb. drums....lb.	.....	.22	.....	.22	.22	.22	.22	.22
Chlorocarbonate, cbys.....lb.	.....	.30	.....	.30	.40	.30	.40	.35
Ether, Absolute, 50 gal drs..lb.	.50	.52	.50	.52	.52	.50	.52	.50
Furoate, 1 lb tins .....lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Lactate, drums works.....lb.	.25	.29	.25	.29	.29	.25	.35	.25
Methyl Ketone, 50 gal drs..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Oxalate, drums works.....lb.	.45	.55	.45	.55	.55	.45	.55	.45
Oxybutyrate, 50 gal drs wks.lb.	.....	.30½	.....	.30½	.30½	.30½	.36	.30
Ethylene Dibromide, 60 lb dr .lb.	.....	.70	.....	.70	.70	.70	.70	.79
Chlorhydrin, 40%, 10 gal cbys. chloro. cont.....lb.	.75	.85	.75	.85	.85	.75	.85	.75
Dichloride, 50 gal drums...lb.	.05	.07	.05	.07	.07	.05	.10	.05
Glycol, 50 gal drs wks.....lb.	.25	.28	.25	.28	.28	.25	30	.25
Mono Butyl Ether drs wks.	.25	.27	.25	.27	.27	.23	.31	.23
Mono Ethyl Ether drs wks	.17	.20	.17	.20	.20	.16	.24	.16
Mono Ethyl Ether Acetate dr. wks.....	.19½	.23	.19½	.23	.23	.19	.26	.19
Mono Methyl Ether, drs.lb.	.21	.23	.21	.23	.23	.19	.23	.19
Stearate.....	.18	.18	.18	.18	.....	.....	.....	.....
Oxide, cyl.....lb.	.....	2.00	....	2.00	2.00	2.00		
Ethylidenaniline.....lb.	.45	.47½	.45	.47½	.47½	.45	.65	.45
Feldspar, bulk.....ton	15.00	20.00	15.00	20.00	25.00	15.00	25.00	20.00
Powdered, bulk works.....ton	15.00	21.00	15.00	21.00	21.00	15.00	21.00	15.00
Ferric Chloride, tech, crystal 475 lb bbls.....lb.	.05	.07½	.05	.07½	.07½	.05	.09	.05
Fish Scrap, dried, wks.....unit	.....	2.75&10	2.75&10	4.25&10	4.35&10	3.90&10	4.25&10	3.65&10
Acid, Bulk 7 & 3½% delivered Norfolk & Balt. basis...unit	.....	2.40&50	.....	2.40&50	3.50&50	3.20&50	4.00&50	3.50&50
Fluorspar, 98%, bags.....	41.00	46.00	41.00	46.00	46.00	41.00	46.00	41.00
Formaldehyde								
Formaldehyde, aniline, 100 lb. drums.....lb.	.....	.....	.....	.....	.....	.....	.....	.....
USP, 400 lb bbls wks.....lb.	.37½	.42	.37½	.42	.42	.37½	.42	.37
Fossil Flour.....lb.	.02½	.04	.02½	.04	.04	.02½	.04	.02½
Fullers Earth, bulk, mines ..ton	15.00	20.00	15.00	20.00	20.00	15.00	20.00	15.00
Imp. powd in bags.....ton	24.00	30.00	24.00	30.00	30.00	24.00	30.00	25.00
Furfural (tech.) drums, wks..lb.	.....	.10	.....	.10	.15	.10	.19½	.17
Furfuramide (tech) 100 lb dr..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Furfuryl Acetate, 1 lb tins....lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Alcohol, (tech) 100 lb dr....lb.	.....	.50	.....	.50	.50	.50	.50	.50
Furoic Acid (tech) 100 lb dr...lb.	.....	.50	.....	.50	.50	.50	1.00	.50
Fusel Oil, 10% impurities ...gal.	.. ..	1.35	.....	1.35	1.35	1.35	1.35	1.35
Fustic, chips.....lb.	.04	.05	.04	.05	.05	.04	.05	.04
Crystals, 100 lb boxes....lb.	.20	.22	.20	.22	.22	.20	.22	.20
Liquid, 50°, 600 lb bbls....lb.	.09	10	.09	.10	.10	.09	.10	.09
Solid, 50 lb boxes.....lb.	.14	.16	.14	.16	.16	.14	.16	.14
Sticks.....ton	25.00	26.00	25.00	26.00	26.00	25.00	26.00	25.00
G Salt paste, 360 lb bbls.....lb.	.45	.50	.45	.50	.50	.45	.52	.45
Gall Extract.....lb.	.18	.20	.18	.20	.20	.18	.21	.18
Gambier, common 200 lb cs. .lb.	.....	.07	.06½	.07	.07	.06	.07	.06
25% liquid, 450 lb bbls....lb.	08	10	.08	.10	.10	.08	.14	.08
Singapore cubes, 150 lb bg..lb.	.09½	.09	.09½	.09	.09	.08½	.09	.08½
Gelatin, tech, 100 lb cases....lb.	.45	.50	.45	.50	.50	.45	.50	.45
Glauber's Salt, tech, c-1 wks.....100 lb.	1.00	1.70	1.00	1.70	1.70	1.00	1.70	.70
Glucose (grape sugar) dry 70-80° bags c-1 NY.....100 lb.	3.24	3.34	3.24	3.34	3.34	3.24	3.34	3.20
Tanner's Special, 100 lb bags .....100 lb.	.....	3.14	.....	3.14	3.14	3.14	3.14	3.14
Glue, medium white, bbls ...lb.	.22	.24	.22	.24	.24	.20	.24	.20
Pure white, bbls.. .....lb.	.25	.26	.25	.26	.26	.22	.26	.22
Glycerin, CP, 550 lb drs.....lb.	.....	.11½	.11½	.14½	.14½	.12½	.16	.13½
Dynamite, 100 lb drs.....lb.	.....	.09½	.09½	.12½	.12½	.11	.12½	.10½
Saponification, tanks.....lb.	.....	.06½	.06½	.07½	.08	.07½	.08½	.07½
Soap Lye, tanks.....lb.	.....	.05½	.05½	.07	.07½	.06½	.07½	.06½
Graphite, crude, 220 lb bgs...ton	15.00	35.00	15.00	35.00	35.00	15.00	35.00	15.00
Flake, 500 lb bbls.....lb.	.06	09	.06	.09	.09	.06	.09	06
Gums								
Gum Accroides, Red, coarse and fine 140-150 lb bags.....lb.	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03
Powd, 150 lb bags .....lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06½

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A New Organic Reagent *for* Magnesium *and* Aluminum

794
8-HYDROXYQUINOLINE

THE use of 8-hydroxyquinoline as an analytical reagent is expanding rapidly. Recent papers in the BUREAU OF STANDARDS JOURNAL OF RESEARCH describe its use in detail. Lundell and Knowles in Vol. 3, 91 (1929) give a method for the separation and estimation of aluminum. Raymond and Bright in the same Journal, Vol. 6, 113, (1931) show how magnesia in portland cement can be determined quickly and accurately with this reagent.

An abstract of either of these articles will be sent promptly on request.

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EASTMAN KODAK COMPANY
Chemical Sales Department
Rochester, N. Y.

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

large producers meeting shortly with foreign factors, it is quite likely that strenuous efforts will be made to curtail production still further.

Cream of Tartar — The weak situation in tartaric acid prices was also reflected in cream of tartar and leading factors announced a new price of 21¾c effective September 28.

Creosote Oil — Inquiries were in better volume specially from several of the larger railroads, but actual sales were unimportant. Coaltar creosote oil figures, listed separately in United States export statistics in 1931 for the first time, show that during the first six months shipments of this commodity, amounting to 1,006,028 gallons, valued at $142,812, went to seventeen different markets, chiefly as follows:—Canada, 518,840 gallons; Mexico, 389,769 gallons; Argentina, 66,915 gallons; Panama, 10,590 gallons; Cuba, 3,640 gallons; British India, 3,078 gallons; Venezuela, 2,304 gallons.

Cresylic Acid — Demand from the textile centers and from disinfectant producers was in good volume. With the mining situation going from bad to worse producers were finding it more difficult to place material. Quotations were unchanged from the level prevailing for the past several months.

Cyanamid — The domestic producer named 97½c, per unit of ammonia, with freight allowed to destination, with the exception of the West Coast. Tonnages were off in September from August figures.

Dextrin — A fair demand was reported from the textile centers. No change in quotations has been made for several months in this item.

Egg Albumen — Effective Oct. 1 the price of crystal material was raised to 61c.

Epsom Salt— Despite somewhat lower volume of sales in 1931 against 1930, the market in this commodity has remained firm with prices unchanged. While some competition exists between domestic and imported material, the market has been able to assimulate both without resorting to disasterous price-cuts.

Ethyl Acetate — With automobile production schedules still a matter of conjecture lacquer manufacturers were unwilling to order ahead in appreciable quantities with the result that while the number of orders was satisfactory the total volume was off. Prices remain firm, but producers are frankly dissatisfied with the present low level. No indication has as yet been made of next year's prices.

Fish-Scrap — The market in this item went through an extremely weak period during the past month. With demand

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Yellow, 150-200 lb bags....lb.	.18	.18	.20	.20	.18	.20	.18
Animi (Zanzibar) bean & pea 250 lb cases.....lb.	.35	.35	.40	.40	.35	.40	.35
Glassy, 250 lb cases.....lb.	.50	.50	.55	.55	.50	.55	.50
Asphaltum, Barbadoes (Manjak) 200 lb bags.....lb.	.09	.09	.12	.12	.09	.12	.09
Egyptian, 200 lb cases.....lb.	.15	.15	.17	.17	.15	.17	.15
Gilsonite Selects, 200 lb bags .....ton	58.00	58.00	65.00	65.00	58.00	65.00	58.00
Damar Batavia standard 136, lb cases.....lb.	.09½	.09¾	.13	.20	.14	.26	.22
Batavia Dust, 160 lb bags.....lb.	.05	.05½	.06	.11	.06	.11	.10½
E Seeds, 136 lb cases.....lb.	.06	.06½	.07	.08	.13	.08	.17½
F Splinters, 136 lb cases and bags.....lb.	.05½	.06	.06½	.07½	.13½	.07	.13½
Singapore, No 1, 224 lb cases lb.	.13	.14	.13½	.15	.24	.18½	.30½
No. 2, 224 lb cases.....lb.	.08	.08½	.08½	.10	.20½	.13	.24
No. 3, 180 lb bags.....lb.	.04½	.05	.05	.06	.11½	.07	.14
Benzoin Sumatra, U. S. P. 120 lb cases.....lb.	.26	.28	.26	.34	.40	.33	.40
Copal Congo, 112 lb bags, clean opaque.....lb.	.16½	.17	.16	.17	.17	.16	.17
Dark, amber.....lb.	.06	.07	.06½	.07½	.08	.07½	.09
Light, amber.....lb.	.12½	.14	.12½	.14	.14	.12½	.14
Water white.....lb.	.37	.45	.37	.45	.45	.37	.36
Mastic.....lb.	.46½	.48	.46½	.58	.65	.57	.65
Manila, 180-190 lb baskets							
Loba A.....lb.	.10	.11	.11	.13	.17½	.13	.17½
Loba B.....lb.	.08	.08½	.09	.10½	.16½	.13½	.16½
Loba C.....lb.	.07½	.08	.08½	.10	.14	.10	.14½
M A Sorts.....lb.	.05	.05½	.05½	.06½	.....	.....	.....
D B B Chips.....lb.	.05½	.06½	.05½	.08	.....	.....	.....
East Indies chips, 180 lb bags lb.	.05	.05½	.05	.05½	.11	.09	.11
Pale bold, 224 lb cs.....lb.	.15½	.16	.15½	.16	.21	.17½	.21
Pale nubs, 180 lb bags....lb.	.08	.08½	.08	.09	.16	.12½	.16
Pontianak, 224 lb cases....							
Bold gen No 1.....lb.	.15½	.16	.16	.17	.21	.19	.23
Gen chips spot.....lb.	.07	.08	.07	.08½	.15	.13½	.15
Elemi, No. 1, 80-85 lb cs...lb.	.09	.09½	.10	.12	.14	.12½	.14
No. 2, 80-85 lb cases.....lb.	.08½	.09	.09½	.11½	.13½	.12	.13½
No. 3, 80-85 lb cases.....lb.	.08	.08½	.08½	.11	.13	.11	.13
Kauri, 224-226 lb cases No. 1 .....lb.	.44	.48	.42	.50	.57	.48	.57
No. 2 fair pale.....lb.	.24	.25	.26	.29	.38	.32	.38
Brown Chips, 224-226 lb cases.....lb.	.10	.12	.10	.12	.12	.10	.12
Bush Chips, 224-226 lb. cases.....lb.	.26	.28	.28	.34	.40	.38	.40
Pale Chips, 224-226 lb cases .....lb.	.19	.21	.19	.22	.26	.24½	.26
Sandarac, prime quality, 200 lb bags & 300 lb casks...lb.	.18½	.20	.18	.22	.40	.27	.72
Helium, 1 lit. bot. .....lit.	.....	25.00	.....	25.00	25.00	25.00	.20
Hematine crystals, 400 lb bbls lb.	.14	.18	.14	.18	.18	.14	.20
Paste, 500 bbls.....lb.	.....	.11	.....	.11	.11	.11	.11
Hemlock 25%, 600 lb bbls wks lb.	.03	.03½	.03	.03½	.03½	.03	.03¼
Bark.....ton	.....	16.00	.....	16.00	16.00	16.00	17.00
Hexalene, 50 gal drs wks.....lb.	.....	.60	.....	.60	.60	.60	.60
Hexamethylenetetramine, drs .lb.	.46	.50	.46	.50	.50	.46	.58
Hoof Meal, fob Chicago....unit	.....	2.50	.....	2.50	3.75	2.50	4.00
South Amer. to arrive....unit	.....	2.70	.....	2.70	3.75	2.70	3.90
Hydrogen Peroxide, 100 vol, 140 lb cbys.....lb.	.21	.24	.21	.24	.26	.21	.26
Hydroxyamine Hydrochloride lb.	.....	3.15	.....	3.15	3.15	3.15	
Hypernic, 51°, 600 lb bbls....lb.	.12	.15	.12	.15	.15	.12	.15
Indigo Madras, bbls.....lb.	1.28	1.30	1.28	1.30	1.30	1.28	1.30
20% paste, drums.....lb.	.15	.18	.15	.18	.18	.15	.18
Synthetic, liquid.....lb.	.....	.12	.....	.12	.12	.12	.12
Iron Chloride, see Ferric or Ferrous							
Iron Nitrate, kegs.....lb.	.09	.09	.10	.09	.10	.09	.10
Coml, bbls.....100 lb.	2.50	2.50	3.25	2.50	3.25	2.50	3.25
Oxide, English.....lb.	.10	.10	.12	.10	.12	.10	.12
Red, Spanish.....lb.	.02½	.02½	.03¼	.02½	.03¼	.02½	.03½
Isopropyl Acetate, 50 gal drs gal.	.85	.85	.90	.90	.85	.90	.85
Japan Wax, 224 lb cases.....lb.	.08	.08½	.08	.11	.15½	.11½	.18
Kieselguhr, 95 lb bgs NY..... Brown.....ton	60.00	60.00	70.00	70.00	60.00	70.00	60.00
Lead Acetate, bbls wks...100 lb.	9.50	9.50	11.00	13.50	10.50	13.50	13.00
White crystals, 500 lb bbls wks.....100 lb.	.....	10.50	12.25	14.50	11.50	14.50	14.00
Arsenate, drs 1c-1 wks.....lb.	.11	.11	.14	.16	.13	.15	.13
Dithiofuroate, 100 lb dr....lb.	.....	1.00	.....	1.00	1.00	1.00	
Metal, c-l NY.....100 lb.	.....	3.75	4.25	4.60	7.75	5.10	7.75
Nitrate, 500 lb bbls wks....lb.	.13	.13	.14	.14	.13	.14	.14
Oleate, bbls.....lb.	.17½	.17½	.18	.18	.17½	.18	.17½
Oxide Litharge, 500 lb bbls.lb.	.07½	.07½	.08	.08½	.08½	.08½	.08½
Red, 500 lb bbls wks....lb.	.07½	.07½	.08½	.09½	.08½	.09½	.09½
White, 500 lb bbls wks...lb.	.07½	.07½	.08	.09½	.07½	.09½	.09
Sulfate, 500 lb bbls wk...lb.	.06¾	.06¾	.07	.08½	.06¾	.08½	.08½
Leuna saltpetre, bags c.i.f...ton	.....	57.60	.....	57.60	57.60	57.60	57.00
S. points c. i. f.....ton	.....	57.90	.....	57.90	57.90	57.90	57.30
Lime, ground stone bags.....ton	.....	4.50	.....	4.50	4.50	4.50	4.50
Live, 325 lb bbls wks...100 lb.	.....	1.05	.....	1.05	1.05	1.05	1.05
Lime Salts, see Calcium Salts							
Lime-Sulfur soln bbls.....gal.	.15	.15	.17	.17	.15	.17	.15
Lithopone, 400 lb bbls 1c-1 wks .....lb.	.04¼	.04¼	.05	.05½	.04¼	.06½	.05½
Logwood, 51°, 600 lb bbls.....lb.	.07	.07	.08	.08½	.07	.08½	.08½
Chips, 150 lb bags.....lb.	.03	.03	.03½	.03½	.03	.03½	.03
Solid, 50 lb boxes.....lb.	.12	.12½	.12	.12½	.12½	.12½	.12½
Sticks.....ton	24.00	24.00	26.00	26.00	24.00	26.00	24.00
Lower grades.....lb.	.07½	.07½	.08	.08	.07½	.08	.07½
Madder, Dutch.....lb.	.22	.22	.25	.25	.22	.25	.22
Magnesite, calc, 500 lb bbl...ton	50.00	50.00	60.00	60.00	50.00	60.00	50.00

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

slow and specially heavy catches in the Baltimore region, first hands were offering material at $2.25 and 10c per unit ton and the ground material was quoted at $48 a ton.

Glues — The market in this commodity continued at a very slow pace during September. Prices were fairly firm except in large orders where concessions were the rule. The output of glue of animal origin during the first half of 1931 compared with the corresponding period of 1930, declined 11,000,000 pounds. Stocks on hand June 30, 1931 were 14,000,000 pounds higher than at the same date last year. The six months output follows: 1930—hide glue, 30,747,000 pounds; bone glue, 27,088,800 pounds; 1931—hide glue, 25,984,958 pounds; bone glue, 20,740,085 pounds.

Glycerine — Producers are looking hopefully to the coming anti-freeze season to move accumulating stocks. C. P. at 11½c is very close to the cost of production and it is unlikely that prices will go lower now for several months, at least, with the backlog of anti-freeze business to look forward to. Exports totaled 174,998 pounds from January through July, this year, against 302,799 pounds during the corresponding period a year ago. Importations were as follows:—Crude, this year, 6,125,866 pounds; last year, 5,530,235 pounds; refined, this year 778,801 pounds; last year 1,153,945 pounds.

Intermediates — The market continued to have a very firm appearance despite the fact that buyers were holding shipments down to current needs. Prices remain unchanged. Aniline oil continued in better demand than most of the other items.

Insecticide Materials — As the month progressed the demand slumped except for lime-sulfur preparations. In most quarters it was thought that 1932 prices for contract would duplicate those in effect now.

Japan Wax — This item fell to a new low when importers in an effort to stimulate sales announced a price of 8c. Stocks on hand are above normal.

Lead — The metal passed through a month of weakness. With all commodity markets adversely effected it was rather surprising that prices held as well as they did. Stocks of refined lead in the United States, September 1 came to 131,082 short tons, down 2,876 tons from 133,958 as of August 1, and comparing with 139,698 on July 1, 142,370 on June 1, the peak for many years, and 72,832 tons September 1, 1930. Shipments in August totaled 38,578 tons, compared with 42,306 in July, 37,063 in June and 48,084 in August, 1930. Production by refineries in the United States

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Magnesium							
Magnesium Carb, tech, 70 lb bags NY lb.	.06	06½	.06	.06½	.06½	.06	.06½	.06
Chloride flake, 375 lb. drs c-l wks ton	.....	36.00	.....	36.00	36.00	36.00	36.00	36.00
Imported shipment ton	31.75	33.00	31.75	33.00	33.00	31.75	33.00	33.00
Fused, imp, 900 lb bbls NY ton	.....	31.00	.....	31.00	31.00	31.00	31.00	31.00
Fluosilicate, crys, 400 lb bbls wks lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Oxide, USP, light, 100 lb bbls lb.	.....	.42	.....	.42	.42	.42	.42	.42
Heavy, 250 lb bbls lb.	.....	.50	.....	.50	.50	.50	.50	.50
Peroxide, 100 lb cs lb.	1.00	1.25	1.00	1.25	1.25	1.00	1.25	1.00
Silicofluoride, bbls lb.	.09½	.10½	.09½	.10½	.10½	.09½	.10½	.09½
Stearate, bbls lb.	.24	.26	.24	.26	.26	.25	.26	.25
Manganese Borate, 30%, 200 lb bbls lb.	.....	.19	.....	.19	.19	.19	.24	.19
Chloride, 600 lb casks lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½	.08
Dioxide, tech (peroxide) drs lb.	.03½	.06	.03½	.06	.06	.03½	.06	.04½
Ore, Powdered or granular.. 75-80%, bbls lb.	.02½	.03	.02½	.03	.03	.02½	.03½	.02½
80-85%, bbls lb.	.....	.03½	.....	.03½	.03½	.03½	.04½	.03½
85-88%, bbls lb.	.04	.04½	.04	.04½	.04½	.04	.05½	.04
Sulfate, 550 lb drs NY lb.	.07	.08	.07	.08	.08	.07	.08½	.07
Mangrove 55%, 400 lb bbls.. lb.	.....	.04	.03½	.04	Nom.	.03½	Nom.	.03½
Bark, African ton	.....	23.00	23.00	29.75	33.00	29.75	35.00	30.00
Marble Flour, bulk ton	14.00	15.00	14.00	15.00	15.00	14.00	15.00	14.00
Mercurous chloride lb.	.....	1.27	1.27	2.05	2.05	2.05	2.05	2.05
Mercury metal 76 lb flask	78.00	79.00	78.00	106.00	124.50	106.00	126.00	120.00
Meta-nitro-aniline lb.	.67	.69	.67	.69	.69	.67	.74	.67
Meta-nitro-para-toluidine 200 lb. bbls lb.	1.40	1.55	1.40	1.55	1.55	1.50	1.55	1.50
Meta-phenylene-diamine 300 lb. bbls lb.	.80	.84	.80	.84	.84	.80	.90	.80
Meta-toluene-diamine, 300 lb bbls lb.	.67	.69	.67	.69	.69	.67	.72	.67
Methanol								
Methanol, (Wood Alcohol),.... 95% gal.	.33	.35	.33	.37	.48	.35	.65	.51
97% gal.	.34	.39	.34	.43	.49	.39	.65	.53
Pure, Synthetic drums cars gal.	.39½	.41½	.39½	.42½	.50	.42½	.68	.53
Synthetic tanks gal.	.....	.35½	.35½	.40½	.50	.40½	.66	.54
Methyl Acetate, drums gal.	.. ..	Nom.	.....	Nom.	Nom.	Nom.	.95	.95
Acetone, gal.	.50	.55	50	.70	.77	.65	.85	.73
Anthraquinone, lb.	.85	.95	.85	.95	.85	.70	.95	.85
Cellosolve, (See Ethylene Glycol Mono Methyl Ether)	.....	.....	.....	.....	.....	.....	.....	.....
Chloride, 90 lb cyl lb.	.45	.45	.45	.45	.45	.45	.60	.45
Furoate, tech., 50 gal. dr., lb.	.....	.50	.....	.50	.50	.50	.50	.50
Mica, dry grd. bags wks lb.	65.00	80.00	65.00	80.00	80.00	65.00	80.00	65.00
Wet, ground, bags wks lb.	110.00	115.00	110.00	115.00	115.00	110.00	115.00	110.00
Michler's Ketone, kegs lb.	.....	3.00	.....	3.00	3.00	3.00	3.00	3.00
Monochlorobenzene, drums see, Chorobenzene, mono lb.								
Monomethylparaminosufate 100 lb drums lb.	3.75	4.00	3.75	4.00	4.00	3.75	4.20	3.75
Montan Wax, crude, bags lb.	.05½	.07	.05½	.07	.07	.06	.07	.06½
Myrobalans 25%, liq bbls b	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03½
50% Solid, 50 lb boxes lb.	.05	.05½	.05	.05½	.05½	.05	.08½	.05
J1 bags ton	34.00	35.00	34.00	35.00	41.00	34.00	43.00	40.00
J 2 bags ton	15.50	17.50	15.50	22.50	26.50	19.75	40.00	26.50
R 2 bags ton	16.00	18.00	16.00	20.00	27.50	19.00	34.00	27.50
Naphtha, v. m. & p. (deodorized) bbls gal.	.14	.16	.14	.18	.16	.16	.18	.16
Naphthalene balls, 250 lb bbls wks lb.	.03½	.04½	.03½	.04½	.05½	.03½	.05½	.05½
Crushed, chipped bgs wks lb.	.....	.04	.....	.04	.04½	.04	.04½	.04½
Flakes, 175 lb bbls wks lb.	.....	.03½	.....	.03½	.05	.03½	.05	.05
Nickel Chloride, bbls kegs lb.	.18	.20	.18	.21	.21	.20	.24	.20
Oxide, 100 lb kegs NY lb.	.37	.40	.37	.40	.40	.37	.40	.37
Salt bbl. 400 bbls lb NY lb.	.10½	.13	.10½	.13	.13	.10½	.13	.13
Single, 400 lb bbls NY lb.	.10½	.12	.10½	.12	.13	.10½	.13	.13
Metal ingot lb.	.35	.35	.35	.....	.....	.....	.....	.....
Nicotine, free 40%, 8 lb tins, cases lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Sulfate, 10 lb tins lb.	.98½	1.20	.98½	1.20	1.20	.98½	1.20	.98½
Nitre Cake, bulk ton	12.00	14.00	12.00	14.00	18.00	12.00	18.00	12.00
Nitrobenzene, redistilled, 1000 lb drs wks lb.	.09	.09½	.09	.09½	.09½	.09	.10½	.09
Nitrocellulose, c-l-l-cl, wks lb.	.25	.36	.25	.36	.36	.25	.36	.25
Nitrogenous Material, bulk unit	.....	1.65	1.65	2.70	3.40	2.50	4.00	3.40
Nitronaphthalene, 550 lb bbls lb.	.....	.25	.....	.25	.25	.25	.25	.25
Nitrotoluene, 1000 lb drs wks lb.	.14	.15	.14	.15	.15	.14	.15	.14
Nutgalls Aleppy, bags lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16
Chinese, bags lb.	.12	.13	.12	.13	.13	.12	.13	.12
Oak Bark, ground ton	30.00	35.00	30.00	35.00	35.00	30.00	50.00	30.00
Whole ton	20.00	23.00	20.00	23.00	23.00	20.00	23.00	20.00
Orange-Mineral, 1100 lb casks NY lb.	.11½	.13	.11½	.13	.13	.11½	.13½	.11½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.25	2.15	2.25	2.15
Orthoanisidine, 100 lb drs lb.	2.50	2.60	2.50	2.60	2.60	2.50	2.60	2.50
Orthochlorophenol, drums lb.	.50	.65	.50	.65	.65	.50	.65	.50
Orthocresol, drums lb.	.25	.25	.25	.25	.35	.18	.28	.18
Orthodichlorobenzene, 1000 lb drums lb.	.07	.10	.07	.10	.10	.07	.10	.07
Orthonitrochlorobenzene, 1200 lb drs wks lb.	.30	.33	.30	.33	.33	.30	.33	.30
Orthonitrotoluene, 1000 lb drs wk lb.	.16	.18	.16	.18	.18	.16	.18	.16
Orthonitrophenol, 350 lb dr lb.	.85	.90	.85	.90	.90	.85	.90	.85
Orthotoluidine, 350 lb bbl 1c-1 lb.	.28	30	.25	.30	.30	.25	.30	.25

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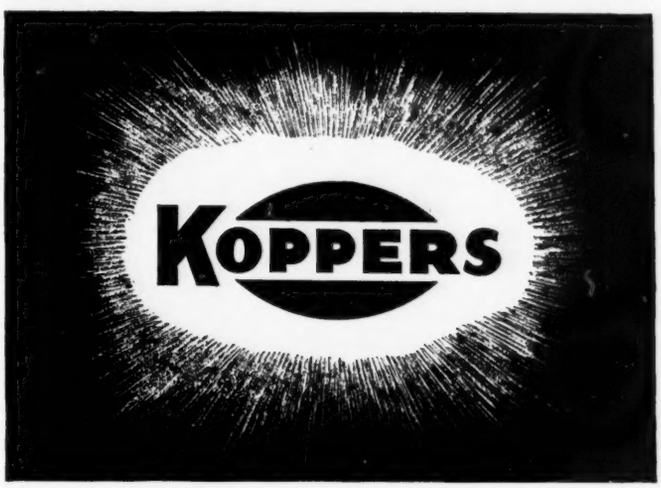

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

in August aggregated 35,702 tons, of which 30,349 tons were from domestic ore and the rest from foreign ore and secondary materials, compared with 36,566 and 32,157 tons, respectively, in July, 34,391 and 30,708 in June.

Magnesium — The leading producer in this country announced during the month a reduction of the metal to 30c in carload quantities and 32c a pound for l.c.l. amounts. The former price was 48c. This reduction should soon result in wider uses being found specially in the engineering field.

Myrrh, Gum — Most of the gums were weak during the month in the face of continued indifference on the part of most buyers. Myrrh was reduced to 15¾c from 17c on Sept. 19. Benzoin was another to be reduced, the new price of 26c being 2c below the former quotation.

Natural Tanstuffs — Several of the natural tanning materials worked down to lower prices. The recent spurt in tanning operations has not been sustained and this fact together with sizable increases in stocks of most of the items brought about slight recessions. Valonia mixtures went to $26.25 a ton against $29, and beards from $38 to $35; wattle bark chopped from $35 to $34.50; quebracho, solid, in bond from 2¾c to 2c.

Nitrogenous Material — The fertilizer commodities were with but one or two exceptions specially weak. Material testing 8 to 10% in bags was quoted at $1.65 per unit ton, c. i. f. Atlantic ports.

Phosphate Rock — In common with most other fertilizer materials this item passed through a very quiet month. July statistics on superphosphates show increase in stocks and production. July production of bulk material was 188,224 tons, compared with 172 299 tons in June and 366 322 tons in July 1930; output of base and mixed goods in July was only 9,471 tons against 16,741 tons in June. The stocks of bulk material at the close of the month were 1,017,875 tons against 955,349 tons at the end of the preceding month and 1,071,028 tons at the end of July last year. Figures recently released by the government disclose that the marketed production in 1930 was the highest figure on record. The apparent consumption of phosphate rock in the United States in long tons in 1930, compared with 1929, is as follows:

*	*Tons* 1930	1929
Marketed production	3,926,392	3,760,855
Imports	32,658	44,899
Exports	1,225,722	1,142,746
Total apparent consump...	2,733,328	2,663,008
†Domestic rock	2,700,670	2,618,109

*Marketed production plus imports minus exports.
†Marketed production minus exports.

*Bureau of Mines

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Orthonitroparachlorphenol, tins ....lb.	.70	.75	.70	.75	.75	.70	.75	.70
Osage Orange, crystals....lb.	.16	.17	.16	.17	.17	.16	.17	.16
51 deg. liquid....lb.	.07	.07½	.07	.07½	.07½	.07	.07½	.07
Powdered, 100 lb bags....lb.	.14½	.15	.14½	.15	.15	.14½	.15	.14½
Paraffin, refd, 200 lb cs slabs								
123-127 deg. M. P....lb.	.....	.03	.03½	.03	.04¾	.03½	.06¾	.04½
128-132 deg. M. P....lb.	.....	.03½	.03½	.03½	.06¾	.03½	.07	.04½
133-137 deg. M. P. ....lb.	.....	.04¼	.04¾	.04½	.07½	.04¾	.07½	.06½
Para Aldehyde, 110-55 gal drs..lb.	.20½	.23	.20½	.23	.23	.20½	.28	.20½
Aminoacetanilid, 100 lb bg..lb.	.52	.60	.52	.60	1.05	.52	1.05	1.00
Aminohydrochloride, 100 lb kegs....lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Aminophenol, 100 lb kegs..lb.	.82	.84	.82	.86	1.02	.92	1.15	.99
Chlorophenol, drums....lb.	.50	.65	.50	.65	.65	.50	.65	.50
Coumarone, 330 lb drums. lb.	.....	.....	.....	.....	.....	.....	.....	.....
Cymene, refd, 110 gal dr. .gal.	2.25	2.50	2.25	2.50	2.50	2.25	2.50	2.25
Dichlorobenzene, 150 lb bbls wks....lb.	.15½	.16	.15½	.20	.20	.17	.20	.17
Nitroacetanilid, 300 lb bbls.lb.	.50	.55	.50	.55	.55	.50	.55	.50
Nitroaniline, 300 lb bbls wks ....lb.	.48	.55	.48	.55	.55	.48	.55	.48
Nitrochlorobenzene, 1200 lb drs wks....lb.	.23	26	.23	.26	.26	.23	.26	23
Nitro-orthotoluidine, 300 lb bbls....lb.	2.75	2.85	2.75	2.85	2.85	2.75	2.85	2.75
Nitrophenol 185 lb bbls....lb.	.45	50	.45	.50	.50	.45	.55	.45
Nitrosodimethylaniline, 120 lb. bbls....lb.	.92	.94	.92	.94	.94	.92	.94	.92
Nitrotoluene, 350 lb bbls....lb.	.29	.31	.29	.31	.31	.29	.31	.29
Phenylenediamine, 350 lb bbls ....lb.	1.15	1.20	1.15	1.20	1.20	1.15	1.20	1.15
Toueneulfonamide, 175 lb bbls....lb.	.70	.75	.70	.75	.75	.70	.75	.70
Toluenesulfonchloride, 410 lb bbls wks....lb.	.20	.22	.20	.22	.22	.20	.22	.20
Toluidine, 350 lb bbls wk...lb.	.42	.43	.40	.44	.40	.38	.42	.38
Paris Green, Arsenic Basis 100 lb kegs....lb.	.....	.27	.....	.27	.27	.27	.27	25
250 lb kegs....lb.	.....	.26	.25	.26	.25	.25	.25	.23
Persian Berry Ext., bbls....lb.	.25	Nom.	.25	Nom.	Nom.	.25	25	.25
Pentasol (see Alcohol, Amyl)...								
Pentasol Acetate (see Amyl Acetate)								
Petrolatum, Green, 300 lb bbl.lb.	.02	.02½	.02	.02½	.02½	.02	.02½	.02
Phenol, 250-100 lb drums....lb.	.14½	.15	.14½	.15	.15	.14½	.16	.13
Phenyl - Alpha - Naphthylamine, 100 lb kegs....lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Phenylhydrazine Hydrochloride ....lb.	2.90	3.00	2.90	3.00	3.00	2.90		
Phosphate								
Phosphate Acid (see Superphosphate)								
Phosphate Rock, f.o.b. mines								
Florida Pebble, 68% basis..ton	3.10	3.25	3.10	3.25	3.15	3.00	3.15	3.00
70% basis....ton	3.75	3.90	3.75	3.90	4.00	3.75	4.00	3.50
72% basis....ton	4.25	4.35	4.25	4.35	4.50	4.25	4.50	4.00
75-74% basis....ton	5.25	5.50	5.25	5.50	5.50	5.25	5.50	5.00
75% basis....ton	.....	5.75	.....	5.75	5.75	5.75	5.75	5.75
77-80% basis....ton	.....	6.25	.....	6.25	6.25	6.25	6.25	6.25
Tennessee, 72% basis....ton	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Phosphorous Oxychloride 175 lb cyl....lb.	.18	.20	.18	.20	.25	.18	.40	.20
Red, 110 lb cases....lb.	.43	.46	.42	.46	.42	.37½	.60	.37½
Yellow, 110 lb cases wks..lb.	.31	.37½	.31	.37½	.37½	.31	.32	.31
Sesquisulfide, 100 lb cs....lb.	.....	.44	.....	.44	.44	.44	.46	.44
Trichloride, cylinders....lb.	.18	.20	.18	.20	.25	.18	.35	.20
Phthalic Anhydride, 100 lb bbls wks....lb.	.15	.16	.15	.16	.20	.15	.20	.18
Pigments Metallic, Red or brown bags, bbls, Pa. wks....ton	37.00	45.00	37.00	45.00	45.00	37.00	45.00	37.00
Pine Oil, 55 gal drums or bbls								
Destructive dist....lb.	.63	.64	.63	.64	.64	.63	.64	.63
Prime bbls....bbl.	8.00	10.60	8.00	10.60	10.60	8.00	10.60	8.00
Steam dist. bbls....gal.	.54	.61	.54	.70	.70	.65	.70	.65
Pitch Hardwood, ... wks....ton	35.00	45.00	35.00	45.00	45.00	35.00	45.00	40.00
Plaster Paris, tech, 250 lb bbls ....bbl.	3.30	3.50	3.30	3.50	3.50	3.30	3.50	3.30
Platinum, Refined....oz.	.....	38.00	38.00	38.00	.....	.....	.....	.....
Potash								
Potash, Caustic, wks, solid...lb.	.06½	.06¾	.06½	.06¾	.06¾	.06½	.07½	.06½
flake....lb.	.0705	08	.0705	.08	.08	.0705	.07½	.0705
Potash Salts, Rough Kainit								
12.4% basis bulk....ton	.....	9.20	.....	9.20	9.20	9.10	9.10	9.00
14% basis....ton	.....	9.70	.....	9.70	9.70	9.60	9.60	9.50
Manure Salts....								
20% basis bulk....ton	.....	12.65	.....	12.65	12.65	12.50	12.50	12.40
30% basis bulk....ton	.....	19.15	.....	19.15	19.15	18.95	18.95	18.75
Potassium Acetate....lb.	.28	.30	.28	.30	.30	.27		
Potassium Muriate, 80% basis bags....ton	.....	37.15	.....	37.15	37.15	36.75	36.75	36.40
Pot. & Mag. Sulfate, 48% basis bags....ton	.....	27.80	.....	27.80	27.80	27.50	27.50	27.00
Potassium Sulfate, 90% basis bags....ton	.....	48.25	....	48.25	48.25	47.75	47.75	47.30
Potassium Bicarbonate, USP, 320 lb bbls....lb.	.09½	.10	.09½	.10	.10	.09½	.14	.09½
Bichromate Crystals, 725 lb casks....lb.	.08¾	.09½	.08¾	.09	.09¼	.08¾	.09¼	.09
Powd., 725 lb cks wks....lb.	.13	.13¼	.13	.13	.13¼	.13	.13¼	.13

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

The following data show the countries in which phosphate rock was produced in 1929 and 1930, insofar as figures are available:

	Metric tons	
	1930	*1929*
Algeria	845,961	747,035
Australia, New South Wales	26	71
Canada	36	1,075
Christmas Island (Straits Settlements)	121,858	119,756
Egypt	313,478	215,311
Makatea Island	176,075	242,990
Morocco, French	1,779,008	1,608,249
Nauru and Oceanic Islands	512,265	585,844
Netherlands, West Indies: Curacao	87,497	103,289
Poland	40,000	39,294
Tunisia	3,326,000	2,511,000
United States (sold or used by producers)	3,989,411	3,821,217

Quicksilver — The market continued its former downward trend with two reductions of $1 a flask each, the new quotation being $78. The change from the gold standard in England had the effect of raising slightly the pound quotation, but the foreign cartel with large stocks is in a very unfavorable position and several factors were quite bearish on the future trend of prices.

Rosins — September was but another month in the downward trend in prices. Some of he better grades held to last month's levels, but the B, D, E, F, and G grades were off and went into new record low prices. Conditions in the primary markets were just as unsettled and unassuring. Receipts were higher than expected. Domestic naval stores exports during August were as follows:—Gum rosin 82,743 barrels, valued at $543,475; wood rosin, 11,554 barrels, value $80,291; gum turpentine, 1,873,301 gallons, value $643,885; wood turpentine 37,057 gallons, value $15,392. August production of naval stores by steam distillation and stocks of these products on hand August 31 were reported as follows:

Production

	Rosin,	*Gallons*	
	500-lb. barrels	*Turpentine*	*Pine oil*
Month of August	17,074	130,358	114,205
Total from April 1, 1931	149,494	1,249,629	985,183

Stocks at Plants

Total Aug. 31, 1931	112,295	267,899	1,866,368
March 31, 1931	125,919	499,331	1,881,705
Change	−13,624	−231,432	−15,337

Note—Rosin production and stocks include all grades of wood rosin.

Shellac — With England releasing the pound sterling from its gold anchorage the markets in London and Calcutta became demoralized. The wide fluctuations in sterling quotations made it difficult to quote prices in dollars and cents. For the moment the markets here remained unchanged. Stocks here are reported as being below normal and any increase in demand here will, it is thought, have the effect of strengthening prices. The difficult part of any survey is estimating what stocks are held in India and that at the moment is an undeterminate factor. The

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Binoxiate, 300 lb bbls lb.	.14	.14	.17	.17	.14	.17	.14
Bisulfate, 100 lb kegs lb.	.....	.30	.....	.30	.30	.30	.30
Carbonate, 80-85% calc. 800 lb casks lb.	.....	.05	.05	.05½	.05½	.05½	.05½
Chlorate crystals, powder 112 lb keg wks lb.	.08	.08½	.08	.08½	.09	.08	.09	.08½
Chloride, crys bbls lb.	.05½	.06	.05½	.06	.06	.05½	.05½	.05½
Chromate, kegs lb.	.23	.28	.23	.28	.28	.23	.28	.23
Cyanide, 110 lb. cases lb.	.55	.57½	.55	.57½	.57½	.55	.57½	.55
Metabisulfite, 300 lb. bbl lb.	.12	.13	.12	.13	.13	.12	.13	.11
Oxalate, bbls lb.	.20	.24	.20	.24	.24	.20	.24	.16
Perchlorate, casks wks lb.	.11	.12	.11	.12	.12	.11	.12	.11
Permanganate, USP, crys 500 & 100 lb drs wks lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16
Prussiate, red, 112 lb keg lb.	.38	.40	.38	.40	.40	.38	.40	.38
Yellow, 500 lb casks lb.	.18½	.21	.18½	.21	.21	.18½	.21	.18½
Tartrate Neut, 100 lb keg lb.	.....	.21	.....	.21	.21	.21	.51	.51
Titanium Oxalate, 200 lb bbls lb.	.21	.23	.21	.23	.23	.21	.25	.21
Propyl Furoate, 1 lb tins lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Pumice Stone, lump bags lb.	.04	.05	.04	.05	.05	.04	.05	.04
250 lb bbls lb.	.04½	.06	.04½	.06	.06	.04½	.06	.04½
Powdered, 350 lb bags lb.	.02½	.03	.02½	.03	.03	02½	.03	.02½
Putty, commercial, tubs 100 lb.	.....	.03½	.....	.03½	.03½	.03½	.03½	.03½
Linseed Oil, kegs 100 lb.	.....	.05½	.....	.05½	.05½	.05½	.05½	.05½
Pyridine, 50 gal drums gal.	1.50	1.75	1.50	1.75	1.75	1.50	1.75	1.50
Pyrites, Spanish cif Atlantic ports bulk unit	.13	.13½	.13	.13½	.13½	.13	.13½	.13
Quebracho, 35% liquid tks lb.	.02½	.03	.02½	.04	.04	.02½	.04	.03
450 lb bbls c-1 lb.	.03½	.03½	.03½	.03½	.03½	.03½	.04½	.03½
35% Bleaching, 450 lb bbl lb.	.04	.05½	.04	.05½	.04½	.05½	.04½	.05½
Solid, 63%, 100 lb bales cif lb.	.....	.02½	.02½	.05½	.05½	.05	.05½	.05½
Clarified, 64%, bales lb.	.....	.03½	.03½	.05½	.05½	.05½	.05½	.05½
Quercitron, 51 deg liquid 450 lb bbls lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Solid, 100 lb boxes lb.	.09½	.13	.09½	.13	.13	.09½	.13	.10
Bark, Rough ton	.....	14.00	.....	14.00	14.00	14.00	14.00	14.00
Ground ton	34.00	35.00	34.00	35.00	35.00	34.00	35.00	34.00
R Salt, 250 lb bbls wks lb.	.40	.44	.40	.44	.45	.40	.46	.44
Red Sanders Wood, grd bbls lb.	.....	.18	.....	.18	.18	.18	.18	.18
Resorcinol Tech, cans lb.	.65	.70	.65	1.25	1.25	.90	1.25	1.15
Rosin Oil, 50 gal bbls, first run gal.	.....	.47	.47	.58	.58	.56	.62	.57
Second run gal.	.....	.51	.51	.61	.61	.59	.64	.60

Rosin

Rosins 600 lb bbls 280 lb. unit ex. yard N. Y.							
B	.....	3.75	3.75	4.95	7.75	5.35	9.25	7.45
D	.....	3.80	3.80	5.50	8.00	5.50	9.25	7.70
E	.....	3.90	3.90	5.90	8.17	5.52½	9.27	8.30
F	.....	3.95	3.95	6.20	8.45	5.55	9.27	8.40
G	.....	4.00	4.00	6.25	8.45	5.60	9.45	8.40
H	.....	4.05	4.05	6.30	8.55	5.60	9.50	8 40
I	.....	4.10	4.10	6.35	8.58	5.62½	9.50	8.40
K	.....	4.15	4.15	6.45	8.65	5.62½	9.55	8.45
M	.....	4.20	4.20	6.70	8.80	5.65	9.85	8.50
N	.....	4.85	4.85	6.95	8.95	6.05	10.30	8.93
WG	.....	6.30	6 15	8.15	9.25	6.85	11.30	9.00
WW	.....	6.55	6.45	8.90	9.85	7.85	12.30	9.30
Rotten Stone, bags mines ton	24.00	20.00	24.00	20.00	30.00	18.00	30.00	24.00
Lump, imported, bbls lb.	.05	.07	.05	.07	.07	.05	.08	.05
Selected bbls lb.	.09	.12	.09	.12	.12	.09	.12	.09
Powdered, bbls lb.	.02	.05	.02	.05	.05	.02	.05	.02
Sago Flour, 150 lb bags lb.	.04½	.05	.04½	.05	.05	.04½	.05	.04½
Sal Soda, bbls wks 100 lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Salt Cake, 94-96% c-1 wks ton	15 00	15.50	15.50	19.00	24.00	15.50	24.00	19.00
Chrome ton	14.00	14.50	14.00	17.00	25.00	14.50	21.00	12.00
Saltpetre, double refd granular 450-500 lb bbls lb.	.06	.06½	.06	.06½	.06½	.06½	.06½	.06½
Satin, White, 500 lb bbls lb	.....	.01½	.....	.01½	.01½	.01½	.01½	.01½
Shellac Bone dry bbls lb.	.28	.30	.28	.29	.47	.28	.61	.47
Garnet, bags lb.	.19	.20	.19	.26	.40	.24	.45	.40
Superfine, bags lb.	.....	.17½	.17½	.22	.39	.20	.47	.39
T. N. bags lb.	.16	.16½	.16	.17	.34	.18	.44	.36
Schaeffer's Salt, kegs lb.	.53	.57	.53	.57	.57	.53	.57	.53
Silica, Crude, bulk mines ton	8.00	11.00	8.00	11.00	11.00	8.00	11.00	8.00
Refined, floated bags ton	22.00	30.00	22.00	30.00	30.00	22.00	30.00	22.00
Air floated bags ton	.....	32.00	.....	32.00	32.00	32.00	32.00	32.00
Extra floated bags ton	32.00	40.00	32.00	40.00	40.00	32.00	40.00	32.00
Soapstone, Powdered, bags f. o. b. mines ton	15.00	22.00	15.00	22.00	22.00	15.00	22.00	15.00

Soda

Soda Ash, 58% dense, bags c-1 wks 100 lb.	.....	1.17½	.....	1.17½	1.40	1.40	1.40	1.40
58% light, bags 100 lb.	.....	1.15	.....	1.15	1.34½	1.34½	1.34½	1.34½
Contract, bags c-1 wks 100 lb.	.....	1.15	1.15	1.15	1.32	1.32	1.32	1.32
Soda Caustic, 76% grnd & flake drums 100 lb.	.....	2.90	.....	2.90	3.35	3.00	3.35	3.35
76% solid drs 100 lb.	.....	2.50	.....	2.50	2.95	2.90	2.95	2.95
Sodium Acetate, tech. 450 lb. bbls wks lb.	.04½	.05	.04½	.06	.05½	.04	.06½	.04½
Arsenate, drums lb.	.25	.35	.25	.35	.19	.18	.19	.18
Arsenite, drums gal.	.50	.75	.50	.75	1.00	.50	1.50	.75
Bicarb, 400 lb bbl NY 100 lb.	.....	2.35	2.35	2.35	2.41	2.41	2.41	2.41

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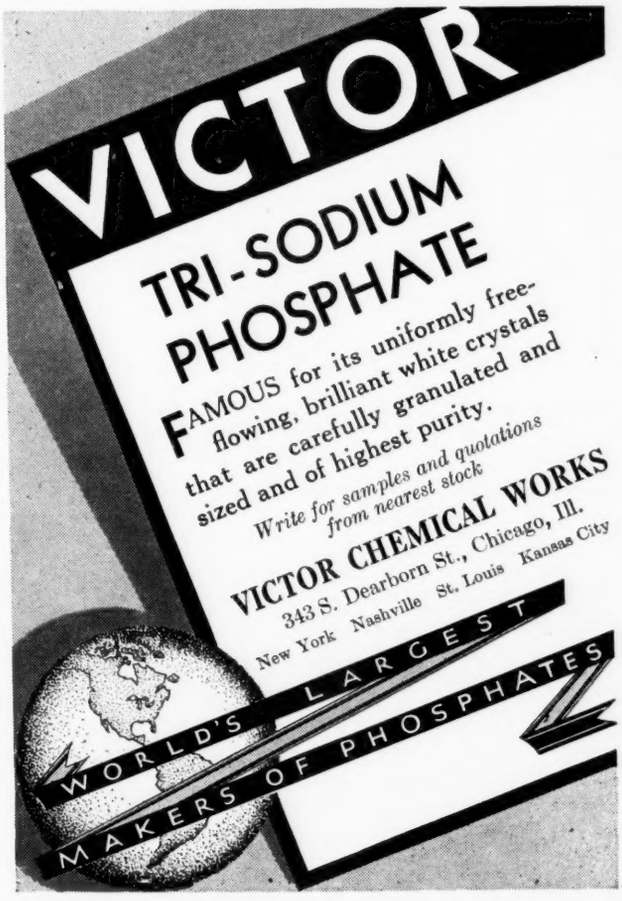
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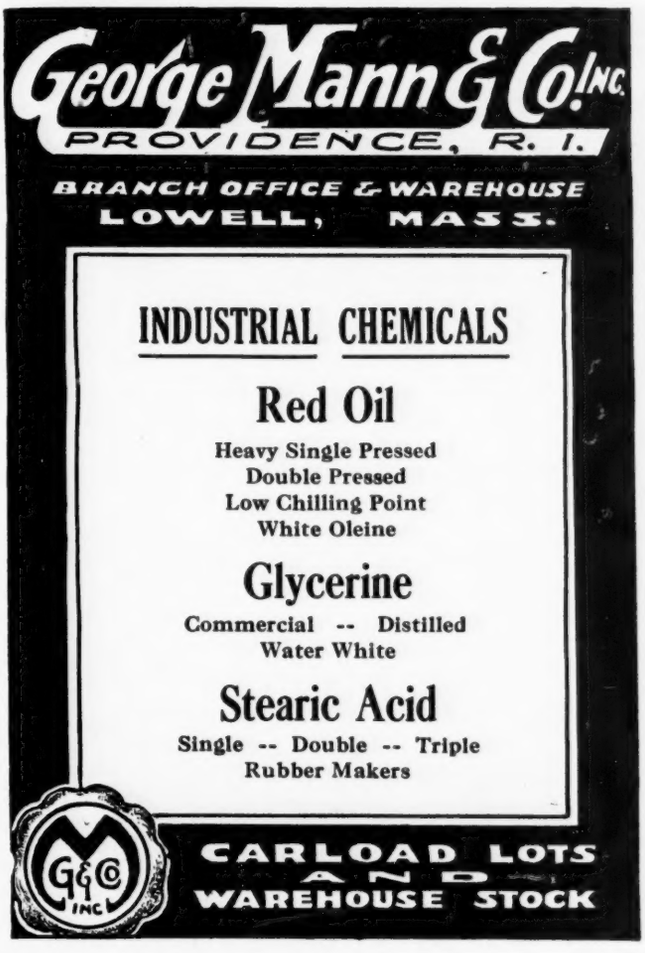

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

rate of importation of gum shellac for 1930 was critically low, 18,981,560 pounds against a previous five-year average of 26,740,200 pounds. This condition continued into 1931—the imports for the first seven months being only 7,201,544 pounds against 11,295,043 pounds in the first seven months of 1930 and a previous five year average for the first seven months of 13,226,200 pounds.

Soda Ash — Buying on spot was at a minimum and shipments against existing contracts reflected a desire on a part of the consuming industries to hold stocks at a very low level. Interest was centering at the close of the month on what the future trend of the alkali market would be for 1932.

Sodium Bichromate — The price for 1932 was still unannounced as the month closed. An improvement in shipping orders from contract customers was an encouraging sign, but spot sales were small. With the announcement of next year's prices considerable activity was expected in this item from the middle of October on.

Sodium Acetate — The fluctuations of August continued into September. On the 25th, the price finally settled back to 4½c, a reduction of 1½c from the 6c level prevailing about the first of the month.

Sodium Nitrate — Prices for natural nitrate were announced on Oct. 1, and proved to be somewhat higher than the level that many were expecting to see. The price schedule as announced is as follows: 100 lb. bags, $1.80; 200 lb. bags $1.76½; bulk, $1.70. In some quarters prices as low as $28 to $30 a ton were talked of. With the release of prices long withheld beyond the usual date considerable improvement is expected in actual business. For the past weeks the nominal price of $2.05 has not been productive of much actual tonnage and buyers must begin shortly to cover next season's requirements. That sales will be below last year in tonnages is to be expected. The agricultural situation is worse instead of better and stocks of mixed goods are heavy and must be moved before next season's operations can be marketed. German prices recently announced and quoted in detail on the Foreign News Section are much lower.

Sodium Phosphate — The silk-weighing centers were operating at greatly reduced schedules in the last two weeks of the month and shipments of the di-salt were off considerably. Sales of tri-for cleaning purposes showed some signs of improving. Prices were held firmly and buyers were making inquiries for next year's prices. It is likely that this commodity will be one where buyers and

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Bichromate, 500 lb cks wks .lb.	.07	.07½	.07	.07½	.07½	.07	.07¾	.07
Bisulfite, 500 lb bbl wks....lb.	.....	.04	.....	.04	.04	.04	.04	.04
Carb. 400 ib bbls NY..100 lb.	.....	2.30	.....	2.30	2.30	2.30	1.35	1.30
Chlorate, ... wks..lb.	.05¾	.07¾	.05¾	.07¾	.08	.05¼	.11	.06½
Chloride, technical.....ton	12.00	13.00	12.00	13.00	13.00	12.00	13.00	12.00
Cyanide, 96-98%, 100 & 250 lb drums wks.....lb.	.16	.17	.16	.17	.20	.16	.20	.18
Fluoride, 300 lb bbls wks...lb.	.07½	.08½	.07½	.08½	.09	.08½	.09	.08½
Hydrosulfite, 200 lb bbls f. o. b. wks.....lb.	.22	.24	.22	.24	.24	.22	.24	.22
Hypochloride solution, 100 lb cbys.....lb.	.....	.05	.....	.05	.05	.05	.05	.05
Hyposulfite, tech, pea cyrs 375 lb bbls wks.....100 lb.	2.40	3.00	2.40	3.00	3.00	2.40	3.05	2.50
Technical, regular crystals 375 lb bbls wks....100 lb.	2.50	2.65	2.50	2.65	2.65	2.50	2.65	2.40
Metanilate, 150 lb bbls.... lb.	.44	.45	.44	.45	.45	.44	.45	.45
Metasilicate, c-l, wks...100 lb.	.....	4.00	.....	4.00	.....	.....	.....	.....
Monohydrate, bbls.....lb.	.....	.02½	.....	.02½	.02½	.02½	.02½	.02½
Naphthionate, 300 lb bbl...lb.	.52	.54	.52	.54	.57	.52	.57	.54
Nitrate, 92%, crude, 200 lb bags c-1 NY.....100 lb.	.....	1.76½	1.76½	2.07	2.22½	1.99	2.22½	2.09
Nitrite, 500 lb bbls spot....lb.	.07	.08	.07¼	.08	.08	.07½	.08	.07½
Orthochlorotoluene, sulfonate, 175 lb bbls wks.....lb.	.25	.27	.25	.27	.27	.25	.27	.25
Oxalate Neut, 100 lb kegs..lb.	.37	.42	.37	.42	.42	.37	.42	.37
Perborate, 275 lb bbls.....lb.	.18	.20	.18	.20	.20	.18	.22	.18
Phosphate, di-sodium, tech. 310 lb bbls.....100 lb.	2.50	3.00	2.50	3.00	3.25	2.65	3.55	3.25
tri-sodium, tech, 325 lb bbls.....100 lb.	.....	3.20	3.15	3.50	4.00	3.25	4.00	3.90
Picramate, 100 lb kegs.....lb.	.6	.72	.69	.72	.72	.69	.72	.69
Prussiate, Yellow, 350 lb bbl wks.....lb.	.11½	.12	.11½	.12	12½	.11½	.12½	.12
Pyrophosphate, 100 lb keg..lb.	.15	.20	.15	.20	.20	.15	.20	.15
Silicate, 60 deg 55 gal drs, wks .....100 lb.	1.65	1.70	1.65	1.70	1.70	1.6	1.70	1.65
40 deg 55 gal drs, wks .....100 lb.	.....	.75	.75	1.00	.80	.70	.80	.70
Silicofluoride, 450 lb bbls NY .....lb.	.....	.04¾	.04	.04¾	.05½	.04	.05½	.05
Stannate, 100 lb drums....lb.	.....	.21	.19½	.26	.43	.24	.43	.38
Stearate, bbls.....lb.	.20	.25	.20	.25	.29	.20	.29	.25
Sulfanilate, 400 lb bbls.....lb.	.16	.18	.16	.18	.18	.16	.18	.16
Sulfate Anhyd, 550 lb bbls c-1 wks.....lb.	.02½	.02¾	.02½	.02¾	.02¾	.02½	.02¾	.02½
Sulfide, 80% crystals, 440 lb bbls wks.....lb.	.02½	.02¾	.02½	.02¾	.02¾	.02½	.02¾	.02½
62% solid, 650 lb drums 1c-1 wks.....lb.	.03	.03½	.03	.03½	.03½	.03	.04	.03½
Sulfite, crystals, 400 lb bbls wks.....lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Sulfocyanide, bbls.....lb.	.28	.35	.28	.35	.35	.28	.76	.28½
Tungstate, tech, crystals, kegs .....lb.	.81	.88	.81	.88	.88	.81	1.40	.88
Solvent Naphtha, 110 gal drs wks.....gal.	.26	.31	.24	.38	.40	.30	.40	.35
Spruce, 25% liquid, bbls.....lb.	.....	.01½	.....	.01½	.01½	.01½	.01½	.01½
25% liquid, tanks wks.....lb.	.....	.01	.....	.01	.01	.01	.01	.01
50% powd, 100 lb bag wks lb.	.02	.02½	.02	.02½	.02½	.02	.02½	.02
Starch, powd., 140 lb bags .....100 lb.	.....	2.57	2.57	3.20	4.02	3.42	4.12	3.82
Pearl, 140 lb bags.....100 lb.	.....	2.77	2.77	3.00	3.92	3.32	4.02	3.72
Potato, 200 lb bags.....lb.	.05½	.06	.05½	.06	.06½	.05½	.06½	.05½
Imported bags.....lb.	.05½	.06½	.05½	.06½	.06½	.05½	.06½	.05½
Soluble.....lb.	.08	.08½	.08	.08½	.08½	.08	.08½	.08
Rice, 200 lb bbls.....lb.	.09	.10	.09	.10	.10	.09	.10	.09½
Wheat, thick bags.....lb.	.06½	.07	.06½	.07	.07	.06½	.07	.06½
Thin bags.....lb.	.09½	.10	.09½	.10	.10	.09½	.10	.09½
Strontium carbonate, 600 lb bbls wks.....lb.	.07½	.07½	.07½	.07½	.07½	.07½	.07½	.07½
Nitrate, 600 lb bbls NY....lb.	.09	.09½	.09	.09½	.09½	.09	.09½	.08½
Peroxide, 100 lb drs.....lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Sulfur								
Sulfur Brimstone, broken rock, 250 lb bag c-1.....100 lb.	.....	2.05	.....	2.05	2.05	2.05	2.05	2.05
Crude, f. o. b. mines.....ton	18.00	19.00	18.00	19.00	19.00	18.00	19.00	18.00
Flour for dusting 99½%, 100 lb bags c-1 NY....100 lb.	.....	2.40	.....	2.40	2.40	2.40	2.40	2.40
Heavy bags c-1.....100 lb.	.....	2.50	.....	2.50	2.50	2.50	2.50	2.50
Flowers, 100%, 155 lb bbls c-1 NY.....100 lb.	.....	3.45	.....	3.45	3.45	3.45	3.45	3.45
Roll, bbls 1c-1 NY.....100 lb.	2.65	2.85	2.65	2.85	2.85	2.65	2.85	2.65
Sulfur Chloride, red, 700 lb drs wks.....lb.	.05	.05½	.05	.05½	.05½	.05	.05½	.05
Yellow, 700 lb drs wks.....lb.	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03½
Sulfur Dioxide, 150 lb cyl....lb.	.07	.07½	.07	.07½	.07½	.07	.08½	.07
Extra, dry, 100 lb cyl.....lb.	.10	.12	.10	.12	.12	.10	.19	.10
Sulfuryl Chloride,.....lb.	.15	.40	.15	.40	.65	.10	.65	.10
Talc, Crude, 100 lb bgs NY...ton	12.00	15.00	12.00	15.00	15.00	12.00	15.00	12.00
Refined, 100 lb bgs NY..ton	16.00	18.00	16.00	18.00	18.00	16.00	18.00	16.00
French, 220 lb bags NY...ton	18.00	22.00	18.00	22.00	22.00	18.00	25.00	18.00
Refined, white, bags....ton	35.00	40.00	35.00	40.00	40.00	35.00	45.00	35.00
Italian, 220 lb bags NY...ton	40.00	50.00	40.00	50.00	50.00	40.00	50.00	40.00
Refined, white, bags....ton	50.00	55.00	50.00	55.00	55.00	50.00	55.00	50.00
Superphosphate, 16% bulk, wks.....ton	.....	7.50	7.50	9.00	9.50	8.00	10.00	9.00
Triple bulk, wks.....unit	.....	.65	.....	.65	.65	.65	.....	.....
Tankage Ground NY.....unit	.....	1.50&10	1.50	3.20&10	4.00&10	3.20&10	4.50&10	4.00&10
High grade f.o.b. Chicago.unit	.....	1.50&10	1.50	3.25&10	3.85&10	3.25&10	4.80&10	3.75&10
South American cif.....unit	.....	2.00&10	2.00	3.40&10	4.25&10	3.40&10	4.80&10	4.35&10
Tapioca Flour, high grade bgs .lb.	.03½	.05	.03½	.05	.05½	.03	.05½	.04½
Medium grade, bags.....lb.	.03	.04	.03	.04	.04½	.02½	.04½	.03½
Tar Acid Oil, 15%, drums....gal.	.24	.25	.24	.25	.27	.24	.27	.26
25% drums.....gal.	.26	.28	.26	.28	.30	.26	.30	.29

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

sellers will have difficulty in getting together. Production is in excess of current needs. On the other hand, prices have been radically reduced and producers are very close to, and in some cases below production costs, and therefore, extremely anxious to at least maintain prices at the current level.

Sodium Silicate — Sellers report continued improvement in shipments into the corrugated box industry. Demand for water white slumped slightly due to curtailed operations in the silk-weighting centers.

Sodium Stannate — A reduction of 2c was announced on Oct. 1. The new level of 19c brings this chemical back to the low for the year.

Solvent Naphtha — An increase of 2c a gallon was announced on Oct. 1.

Tin — With the international financial situation seriously upset it was to be expected that the recent improvement in price should be completely discounted and towards the latter part of the month 22¼c was reached, the previous low for the year. World stocks of tin decreased 1,314 tons in August. Total world output for the month amounted to 8,029 tons, against 9,259 tons in July, decrease of 1,230 tons. American deliveries increased from 5,100 tons in July to 5,270 tons in August.

Tin Tetrachloride — In sympathy with the drop in crystals the salt was reduced to .1695. This brings this commodity to a new low price for the present recession. Apparently the efforts of the tin curtailment program was unable to offset the weakness caused principally by the change from the gold standard in England. With this action passed and Siam production reduced, it is thought in several quarters, that prices would soon rise, specially so, because of the inflation that usually follows any change from a gold standard.

Toluol — In sympathy with the rise in benzol and other derivatives toluol was increased 3c a gallon effective Oct. 1.

Turpentine — While quotations both locally and in the primary markets fluctuated within comparatively narrow limits the general tone of the market was one of pessimism. Receipts were larger than expected and while inquiries and sales were fair, buyers were still limiting purchasing to small quantities.

Xylol — Leading producers announced a 2c a gallon increase as of the first of October. This increase was not entirely unexpected in the trade. Despite considerable curtailment in demand, stocks have fallen off due to the very restricted operations in the by-products field.

Chinawood Oil — Several conditions combined to give the market in this item a much stronger outlook as the month

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Terra Alba Amer. No. 1, bgs or bbls mills.....100lb.	1.15	1.15	1.75	1.75	1.15	1.75	1.15
No. 2 bags or bbls...100lb.	1.50	1.50	2.00	2.00	1.50	2.00	1.50
Imported bags.....lb.	.01½	.01½	.01½	.01½	.01½	.02½	.01
Tetrachlorethane, 50 gal dr...lb.	.09	.09	.09½	.09½	.09	.09½	.09
Tetralene, 50 gal drs wks.....lb.	.....	.20	.....	.20	.20	.20	.20
Thiocarbanilid, 170 lb bbl....lb.	.26½	.28½	.26½	.28½	.28½	.22	.24	.22
Tin Bichloride, 50% soln, 100 lb bbls wks.....lb.	.....	.12½	.....	.12½	.12½	.12½	.14½	.13½
Crystals, 500 lb bbls wks...lb.	.....	.25	.24	.28½	.34	.25	.38	.33
Metal Straits NY.....lb.	.....	.22½	.22½	.27	.38	.26	.48	.39
Oxide, 300 lb bbls wks.....lb.	.25	.29	.25	.29	.42	.25	.56	.42
Tetrachloride, 100 lb drs wks .....lb.	.....	.1785	.17½	.19½	.20½	.18½	.30½	.27½
Titanium Dioxide 300 lb bbl..lb	.21	.22	.21	.22	.50	.21	.50	.22
Pigment, bbls.....lb.	.06½	.07½	.06½	.07½	.07½	.06½	.14	.07½
Toluene, 110 gal drs.....gal.	.....	.34	.....	.34	.40	.35	.45	.45
8000 gal tank cars wks....gal.	.27	.28	.27	.30	.35	.30	.40	.40
Toluidine, 350 lb bbls.....lb.	.88	.89	.88	.94	.94	.90	.94	.90
Mixed, 900 lb drs wks.....lb.	.27	.32	.27	.32	.32	.27	.32	.31
Toner Lithol, red, bbls.....lb.	.90	.95	.90	.95	.95	.90	.95	.85
Para, red, bbls.....lb.	.....	.80	.....	.80	.80	.80	.80	.70
Toluidine .....lb.	1.50	1.55	1.50	1.55	1.55	1.50	1.55	1.50
Triacetin, 50 gal drs wks.....lb.	.32	.36	.32	.36	.36	.32	.36	.32
Trichlorethylene, 50 gal dr...lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Triethanolamine, 50 gal drs...lb.	.40	.42	.40	.42	.42	.40	.60	.55
Tricresyl Phosphate, drs.....lb.	.33	.45	.33	.45	.45	.33	.45	.33
Triphenyl guanidine.....lb.	.58	.60	.58	.60	.60	.58	.70	.58
Phosphate, drums.....lb.	.60	.70	.60	.70	.70	.60	.75	.60
Tripoli, 500 lb bbls.....100 lb.	.75	2.00	.75	2.00	2.00	1.75	2.00	1.75
Tungsten, Wolframite,..per unit	11.00	11.75	11.00	11.75	.....	.....	.....	.....
Turpentine carlots, bbls.....gal.	.36½	.36½	.36½	.57	.61½	.41	.65	.51½
Wood Steam dist. bbls....gal.	.38	.40	.38	.61	.52	.36	.57	.49
Urea, pure, 112 lb cases.....lb	.15	.17	.15	.17	.17	.15	.30	.15
Fert. grade, bags c.i.f.....ton	....	82.60	.....	82.60	108.00	108.00	105.00	98.00
c. i. f. S. points.....ton	.....	82.60	.....	82.60	109.30	109.30	106.30	99.30
Valonia Beard, 42%, tannin bags.....ton	.....	35.00	35.00	40.00	40.00	39.50	55.00	42.00
Cups, 30-31% tannin.....ton	22.50	23.50	22.50	25.00	27.00	24.00	35.00	30.00
Mixture, bark, bags.....ton	26.25	29.00	26.25	31.00	32.50	30.00	43.00	35.00
Vermillion, English, kegs....lb..	1.75	1.80	1.75	1.80	2.05	1.75	2.05	2.00
Vinyl Chloride, 16 lb cyl.....lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Wattle Bark, bags.....ton	33.00	34.50	33.00	41.00	47.75	40.00	49.75	43.50
Extract 55%, double bags ex-dock.....lb.	.05	.06½	.05	.06½	.06½	.05½	.06½	.06½
Whiting, 200 lb bags, c-l wks .....100 lb.	.85	1.00	.85	1.00	1.00	1.00	1.25	1.00
Alba, bags c-l NY.....ton	.....	13.00	.....	13.00	13.00	13.00	13.00	13.00
Gilders, bags c-l NY...100 lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Xylene, 10 deg tanks wks. .gal.	.....	.28	.....	.28	.31	.28	.33	.33
Commercial, tanks wks...gal.	.24	.25	.24	.30	.33	.25	.32	.30
Xylidine, crude.....lb.	.36	.37	.36	.37	.38	.37	.38	.38

Zinc

Zinc Ammonium Chloride powd., 400 lb bbls.....100 lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Carbonate Tech, bbls NY..lb.	.10½	.11	.10½	.11	.11	.10½	.11	.10½
Chloride Fused, 600 lb drs. wks.....lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Gran., 500 lb bbls wks.....lb.	.05½	.06	.05½	.06	.06½	.05½	.06½	.06½
Soln 50%, tanks wks...100 lb.	2.25	3.00	2.25	3.00	3.00	2.25	3.00	3.00
Cyanide, 100 lb drums.....lb.	.38	.39	.38	.39	.41	.38	.41	.40
Dithiofuroate, 100 lb dr....lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Dust, 500 lb bbls c-l wks...lb.	.0560	.0585	.0560	.07	.11	.06	.08½	.08½
Metal, high grade slabs c-l NY.....100 lb.	.....	4.20	3.60	4.45	6.45	4.10	6.45	6.45
Oxide, American bags wks..lb.	.06½	.07	.06½	.07	.07½	.06½	.07½	.07
French, 300 lb bbls wks...lb.	.09½	.11½	.09½	.11½	.11½	.09½	.11½	.09½
Perborate, 100 lb drs.....lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Peroxide, 100 lb drs.....lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Stearate, 50 lb bbls.....lb.	.19	.22	.19	.23	.26	.20	.26	.25
Sulfate, 400 bbl wks.....lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Sulfide, 500 lb bbls.....lb.	.16	.16½	.16	.16½	.32	.16	.32	.30
Sulfocarbolate, 100 lb keg..lb.	.28	.30	.28	.30	.30	.28	.30	.28
Zirconium Oxide, Nat. kegs...lb.	.02½	.03	.02½	.03	.03	.02½	.03	.02½
Pure kegs.....lb.	.45	.50	.45	.50	.50	.45	.50	.45
Semi-refined kegs.....lb.	.08	.10	.08	.10	.10	.08	.10	.08

Oils and Fats

Castor, No. 1, 400 lb bbls.....lb.	.11	.11½	.11	.12	.13½	.11½	.13½	.13
No. 3, 400 lb bbls.....lb.	.10½	.11	.10½	.11½	.13	.11	.13	.12½
Blown, 400 lb bbls.....lb.	.13½	.14	.13½	.14	.15	.12	.15	.14
China Wood, bbls spot NY...lb.	.07½	.07½	.07	.07½	.13	.07	.16	.14½
Tanks, spot NY.....lb.	.06½	.06½	.06	.07	.11½	.06	.15	.13½
Coast, tanks,.....lb.	.05½	.06½	.05½	.06½	.10½	.05½	.14½	.12½
Cocoanut, edible, bbls NY....lb.	.....	.10½	.....	.10½	.10½	.10½	.10½	.10½
Ceylon, 375 lb bbls NY....lb.	.06½	.06½	.06½	.06½	.08½	.06½	.09½	.07½
8000 gal tanks NY.....lb.	.04½	.05	.04½	.06	.07	.05½	.08½	.06½
Cochin, 375 lb bbls NY....lb.	.06½	.07	.06½	.07	.09½	.07½	.10	.09½
Tanks NY.....lb.	.05½	.05½	.05½	.05½	.08½	.07	.09½	.08½
Manila, bbls NY.....lb.	.06½	.07	.06½	.07	.08½	.06½	.09½	.07½
Tanks NY.....lb.	.03½	.05½	.03½	.05½	.07½	.05½	.08½	.06½
Tanks, Pacific Coast.....lb.	.03	.03½	.03	.05	.07	.05½	08	.06½

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - Sept. 1931 $1.453

closed. The change from the gold standard in England, better demand from domestic consumers and fewer offerings from primary sources due to flood and war conditions in China. Imports of tung oil, during July 1931, amounted to 5,976,041 pounds valued at $339,404 contrasted with 12,269,617 pounds, worth $1,514,940 received during the same month of 1930. Total importations of 43,766,664 pounds, valued at $2,593,891 were recorded during the first seven months of 1931 compared with 80,981,097 pounds, worth $7,484,332 brought in during the corresponding period of 1930.

Cocoanut Oil — Further weakness was in evidence, prices being shaded whenever sellers felt that worthwhile tonnage was to be gotten. Offerings on the Coast for prompt shipment dropped to 3c, while sales were reported here at 3⅜c. Buyers were making a large number of inquiries, but actual business placed was very small, being below the previous month.

Cod Oil — Freer offerings from primary sources brought about a slightly firmer market. It was reported that 28c might be done on tanked oil for October

Corn Oil — Crude material was easy throughout the entire month. Generally the market was off about ½c from August figures.

Cottonseed Oil — The market locally worked down to lower levels in sympathy with the drop in the security markets and the sweeping reduction in cotton prices. Reports on the cotton crop are conflicting and uncertain. While the weather in some sections has been unfavorable in other parts of the country the growth is ahead of normal.

Linseed Oil — With the paint industry still failing to show the expected rally and consumers in other industries still buying in hand-to-mouth quantities, coupled with lower prices for flaxseed, crushers offered lower quotations at the close of the month. Carlots in cooperage were quoted at 7.4c and 6.8c in tanks. Some further shading from the announced schedule was in evidence on sizable quantities.

Menhadan Oil — Crude was in a quiet position with light offerings. A better demand specially against existing contracts was reported from several sources.

Neatsfoot Oil — Prices were weak in the face of little demand from consuming channels.

Olive Oil Foots — Offerings from abroad were in small volume and the market absorbed these without any great difficulty. Actual sales into the soap industry however were disappointing to first hands who expected a decided improvement with the end of the summer.

	Current Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cod, Newfoundland, 50gal bbls gal.	.26	.30	.26	.48	.56	.46	.64	.57½
Tanks NY gal.	.24	.26	.24	.45	.62	.48	.60	.60
Cod Liver see Chemicals								
Copra, bags lb.	.0225	.0275	.0225	.0325	.046	.039	.05½	.042
Corn, crude, bbls NY lb.	.07	.09	07	.09	.10	.08½	.10¾	.09½
Tanks, mills lb.	.04½	.05	.04½	.07½	.08	.06½	.09½	.07½
Refined, 375 lb bbls NY lb.	.10½	.10½	.10½	.10½	.10½	.09½	.11¾	.10¼
Tanks lb.	.08½	.08¾	.08	.08¾	.10	.08	.11	.09
Cottonseed, crude, mill lb.	.....	.04½	.04½	.07	.07½	.06½	.09	.08½
PSY, Oct. 1 ... 100 lb bbls spot	3.46	4.00	.....	.....	.....	.....	.....	.....
Degras, American, 50 gal bbls NY lb.	.03¼	.04	.03½	.04½	.04½	.03½	.05	.03½
English, brown, bbls NY lb.	.....	.04	.04	.05	.05	.04½	.05½	.04½
Light, bbls NY lb.	.04	.04½	.04	.05½	.05½	.05	.05½	.05
Dog Fish, Coast Tanks gal.	.....	.32	.....	.32	.34	.32		
Greases								
Greases, Brown lb.	.02	.02½	.02	.04½	.06½	.04	.08½	.06
Yellow lb.	.02	.02½	.02	.05	.07½	.03⅞	.08½	.06½
White, choice bbls NY lb	.04	.03¾	.03¾	.05¼	.08½	.06	.11½	.07½
Herring, Coast, Tanks gal.	.....	Nom.	.....	Nom.	.....	.....		
Horse, bbls lb.	.05½	Nom.	.05½	Nom.	Nom.	.05½	Nom.	.....
Lard Oil, edible, prime lb.	.11½	.11½	.11½	.13	.13½	.12½	.15¾	.14¾
Extra, bbls lb.	.....	.07½	.07½	.10	.12	.10	.13½	.12
Extra No. 1, bbls lb.	.....	.06½	.06½	.09¼	.11	.09¼	.13¼	.11¼
Linseed, Raw, five bbl lots lb.	.....	.082	.082	.102	.146	.096	.162	.105
Bbls c-l spot lb.	.....	.074	.074	.098	.142	.092	.158	.101
Tanks lb.	.068	.068	.068	.092	.134	.086	.15	.093
Menhaden Tanks Baltimore gal.	.16½	.17½	.1	.22	.50	.21	.52	.45
Extra, bleached, bbls NY gal.	.44	.45	.44	.53	.70	.52	.70	.70
Light, pressed, bbls NY gal.	.33	.34	.33	.38	.64	.36	.64	.63
Yellow, bleached, bbls NY gal.	.36	.37	.36	.42	.67	.38	.67	.66
Mineral Oil, white, 50 gal bbls gal.	.40	.60	.40	.60	.60	.40	.60	.40
Russian, gal gal.	.95	1.00	.95	1.00	1.00	.95	1.00	.95
Neatsfoot, CT, 20° bbls NY lb.	.13½	.14	.13½	.16	.17⅜	.16½	.19	.18½
Extra, bbls NY lb	.07	.08	.07	.10	.11½	.09½	.13½	.12
Pure, bbls NY lb.	.09½	.09½	.09½	.12	.13½	.11½	.15½	.13½
Oleo, No. 1, bbls NY lb.	.....	.06½	.06½	.08	.12½	.08⅞	.11½	.10¾
No. 2, bbls NY lb.	.....	.05½	.05½	.08	.11	.08½	.11½	.10
No. 3, bbls NY lb.	.....	.06¼	.06¼	.09	.10½	.09	.10½	.09½
Olive, denatured, bbls NY gal.	.77	.80	.77	.80	1.00	.70	1.40	1.05
Edible, bbls NY gal.	1.50	2.00	1.50	2.00	2.00	1.75	2.00	1.95
Foots, bbls NY lb.	.06½	.06¾	.06½	.06¾	.08	.06	.11½	.08½
Palm, Kernel, Casks lb.	.04½	.05	.04½	.06¼	.08¼	.06	.09	.08
Lagos, 1500 lb casks lb.	.05	.06	.05	.06	.07½	.05½	.09	.07½
Niger, Casks lb.	.03⅝	.04½	.03⅝	.05¼	.07½	.05½	.08¼	.07
Peanut, crude, bbls NY lb.	.....	.05	.05	.05	Nom.	.....	Nom.	.....
Refined, bbls NY lb.	.11	.12½	.11	.14	.15	.12	.15	.14½
Perilla, bbls NY lb.	.08	.09	.08	.11	.14½	.10	.20	.15
Tanks, Coast lb.	.....	.06½	.05½	.09	.11½	.08	.15¼	.13
Poppyseed, bbls NY gal.	1.70	1.75	1.70	1.75	1.75	1.70	1.75	1.70
Rapeseed, blown, bbls NY gal.	.70	.71	.70	.73	1.00	.74	1.04	1.04
English, drms. NY gal.	.....	.75	.....	.75	.82	.75	.90	.82
Japanese, drms. NY gal.	.56	.58	.56	.58	.70	.56	.88	.72
Red, Distilled, bbls lb.	.07⅞	.08	.07⅞	.09	.10⅜	.08⅜	.11⅛	.10⅛
Tanks lb.	.....	.07	.07	.08½	.09½	.07½	.10½	.09½
Salmon, Coast, 8000 gal tks. gal.	.....	.22	.22	.22	.44	.42	.44	.42
Sardine, Pacific Coast tks gal.	.18	.19	.18	.19	.42	.18	.51	.45
Sesame, edible, yellow, dos lb.	.09½	.10¾	.09½	.10¾	.12	.09	.12	.11½
White, dos lb.	.....	.12	.10	.12	.12½	.10	.12½	.12½
Sod, bbls NY gal.	.....	.40	.....	.40	.40	.40	.40	.40
Soy Bean, crude								
Pacific Coast, tanks lb.	.06	.07	.06	.08	.09½	.07	.10⅞	.09
Domestic tanks, f.o.b. mills, lb.	.05	.05½	.05	.07	.08½	.07	.10¼	.08½
Crude, bbls NY lb.	.071	.08	.071	.08	.10¾	.10	.12½	.11⅞
Tanks NY lb.	.065	.07	.065	.08	.09¾	.09	.11½	.10½
Refined, bbls NY lb.	.08	.09	.08	.09	.13½	.13	.13¼	.13½
Sperm, 38° CT, bleached, bbls NY gal.	.77	.79	.77	.85	.85	.84	.85	.84
45° CT, bleached, bbls NY gal.	.72	.74	.72	.80	.80	.79	.80	.79
Stearic Acid, double pressed dist bags lb.	.08½	.09	.08½	.11	.15	.13½	.18½	.15½
Double pressed saponified bags lb.	.08½	.09	.08½	.12	.15½	.14½	.19	.15¾
Triple, pressed dist bags lb	.11	.11½	.11	.14	.17	.15½	20½	.17½
Stearine, Oleo. bbls lb.	.....	.07½	.07½	.08¾	.09½	.08½	.12	.09½
Tallow City, extra loose lb.	.....	.02⅞	.02⅞	.04	.07½	.04½	.08¾	.07
Edible, tierces lb.	.04	.04½	.04	.06	.09½	.05½	.10½	.08
Tallow Oil, Bbls, c-1 NY lb.	.07	.07½	.07	.08¾	.11	.08½	.12	.10¾
Acidless, tanks NY lb.	.07⅞	.09	.07⅞	.09	.10	.08½	.11	.09¼
Vegetable, Coast mats lb.	.06	Nom.	.06½	Nom.	Nom.	.06½	Nom.	.08
Turkey Red, single bbls lb.	.08⅝	.09	.08⅝	.10	.12	.10	.12	.11
Double, bbls lb.	.10	.12	.12	.10	.16	.13	.16	.14
Whale, bleached winter, bbls NY gal.	.....	.74	.....	.74	.74	.74	.80	.74
Extra, bleached, bbls NY gal.	.....	.68	.66	.77½	.76	.76	.82	.76
Nat. winter, bbls NY gal.	.....	.65	.63	.72	.73	.73	.78	.73

ADVERTISING PAGES REMOVED

Index to Advertisers

Kalbfleisch Corp., The, New York City.....Cover 2
Klipstein & Sons, E. C., New York City.....429
Koppers Products Co., Pittsburgh, Pa.....423

Mallinckrodt Chemical Works, St. Louis, Mo.....421
Mann & Co., G., Providence, R. I.....427
Mathieson Alkali Works, New York City.....339
Mechling Bros. Chemical Co., Camden, N. J.....433
Merck & Co., Rahway, N. J.....411
Monsanto Chemical Works, St. Louis, Mo. Insert facing page 369
Mutual Chemical Co., New York City.....Cover 1

National Aniline & Chemical Co., New York City
Insert facing page 353
Natural Products Refining Co., Jersey City, N. J.....354
N. Y. Quinine & Chemical Works, Brooklyn, N. Y.....433
Newport Chemical Works, Passaic, N. J.....439
Niacet Chemicals Corp., Niagara Falls, N. Y.....423
Nichols Copper Co., New York City.....433

Pacific Coast Borax Co., New York City.....425
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.....419
Pennsylvania Sugar Company, Philadelphia, Pa.....343
Philadelphia Quartz Co., Philadelphia, Pa.....436
Polachek, Z. H., New York City.....437

Roessler & Hasslacher Chemical Co., New York City.....346

Sharples Solvents Corp., Philadelphia, Pa..Insert facing page 368
Sholes, Inc., New York City.....436
Shriver & Co., T. Harrison, N. J.....390
Solvay Sales Corporation, New York City.Insert facing page 352
Southern Agricultural Chemical Corp., Atlanta, Ga.....425
Standard Silicate Co., Cincinnati, Ohio.....438
Starkweather, J. U., Co., Providence, R. I.....425
Stauffer Chemical Co., New York City.....413
Swann Corp., The, Birmingham, Ala.....Cover 3

Turner & Co., Joseph, New York City.....407

U. S. Industrial Alcohol Co., New York City.....400
U. S. Potash Co., New York City.....429

Victor Chemical Works, Chicago, Ill.....427

Warner Chemical Co., New York City.....350
Wiarda & Co., Inc., John C., New York City.....429
Wishnick-Tumpeer, Inc., New York City.....Cover 4
Wood Distillers Corp., Paterson, N. J.....407

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"We"—Editorially Speaking

It wasn't so much what the Interstate Muscle Shoals Commission said in their recent report as what they implied. Between the lines they pretty plainly think of the operation as a farm relief measure, and confess that the preference as a lessee should be accorded a corporation exclusively owned and controlled by an organization of farmers. Imagination staggers at this thought.

The Commission also hints darkly at an improvement in the fixation process that will make Muscle Shoals effectively competitive with the synthetic ammonia plants. Maybe so: but we hope not—that is, unless the new technology is so revolutionary that it will simply abolish war in the nitrogen market.

Does anyone envy Richard Whitney his present post as President of the New York Stock Exchange? Everyone, however, does admire his calm judgment and keen sense of proportion. The mantle of president fell upon his shoulders in May, 1929. Five months later the stock market over-night became a thing of distrust to a large part of our population. For twenty months now Mr. Whitney has inspired confidence when that commodity has been scarce in the very places where it was the most needed. Only a few weeks ago when England forsook the gold standard and closed its exchanges, he insisted that a free and open market be maintained here and the wisdom of that decision was at once apparent. Mr. Whitney is a young man—forty-three years on August 1, last—the youngest to hold his important position. He was born in Beverly, Massachusetts, graduated from Harvard in 1911, and for several years past has been the active head of Whitney & Co. He is married and has two lovely young daughters. Mr. Whitney makes his winter home in New York City, but from early spring until the end of October he prefers his estate at Short Hills, N. J.

Under austere countenance George H. Buchanan hides a warmth of feeling that continually crops out in unexpected ways. He has never been known to waste a word in writing a technical report, but he continually takes time to make valuable and timely suggestions to fellow research workers. Dr. Landis and Mr. Buchanan were joint pioneers in fifteen years of work in the introduction and commercial development of black cyanide. The latter was, therefore, well qualified to "carry on" at the last meeting of the Electrochemical Society the preliminary statements of Dr. Landis made before the same Society eleven years ago. Mr. Buchanan has had for many years direct charge of the research laboratories of the Cyanamid Co., at Warners, N. J. As the interests of that company became more diversified he came to New York as Chief Technologist, responsible for the research and development work.

Previous to going with American Cyanamid, Mr. Buchanan was connected with New Jersey Zinc and also for a time was Assistant Professor of Chemical Engineering at M. I. T. He is married and has three children. He is a member of the Chemists' Club in New York and of several hobbies, the chief one is, accuracy.

Detroit is usually associated with the automobile industry. Yet a Detroit paper points out that one-third of the soda ash and 40 per cent of the pharmaceuticals produced in this country are manufactured in the Greater Detroit area.

IN NOVEMBER

S. J. Cook
Canadian Research Council
Writes on
"Recent Chemical Developments in Canada"

Luther Martin IV
Wilckes, Martin, Wilckes
On
"The Lampblack Industry, Past and Present"

Charles S. Wehrly
Henry A. Peabody & Co.
On
"Mercury Markets"

And, in the Plant Management Section

Thomas Meehan
On
"Power for the Chemical Plant"

Stewart J. Owen, Jr.
National Safety Council
On
"Checking Your Plant for Safety"

"The Dyestuffs Reporter is the authority for the statement that at the beginning of the present economic slump a manufacturer of automatic regulating and control equipment mapped out the following sales attack as a defense against depression and found that 1930 was the best year since the war. Here are the ten "commandments."

1. Increasing the amount of advertising.
2. Paying more attention to layout and copy.
3. New products and new markets.
4. Improving older products.
5. Development and research work.
6. Strengthening organization.
7. Improving catalogue and literature.
8. Tripling amount expended at exhibitions and shows.
9. Clever sales control and direction.
10. Regular use of dramatic sales approach.

Dr. Charles E. Mullin who with his assistant, Dr. Howard L. Hunter is surveying the entire synthetic acetic acid field is known to Chemical Markets' readers. Earlier in the year he wrote a similar series of articles on the Synthetic Yarn Industry. Dr. Mullin was in New York recently and treated us to a very pleasant half hour's dissertation on the South and the textile industry. Modesty prevented him from telling of the part he has played in that development below the Mason and Dixon Line, but the hundreds of thoroughly trained chemists, trained not only in theory, but in practice as well, are but one of his many contributions. As Professor of Textile and Dyeing at Clemson College he has furnished southern industry not only with men who could carry on for the textile manufacturers deserting the East for the South, but men who could bring a great deal more, minds trained, not by rule-of-thumb methods, but along scientific lines, capable of independent thinking and research. Dr. Mullin possesses a very valuable knack of being able to transmit his own knowledge to others, whether it be in the classroom or the printed word. He is a consultant to several of the large textile plants. Books, expensive first editions are Dr. Mullin's hobby—to the unsympathetic and uninitiated, his weakness. His charming personality, the warmth of his friendly grasp left a void in our sanctum when he left. After meeting him personally we can readily understand the whys and wherefors of his outstanding success.